

# The MINING CONGRESS JOURNAL

Volume 10

DECEMBER, 1924

No. 12

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The New Income Tax Regulations  
Coal Information Which Misleads Users  
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A Tariff on Minerals  
National Legislation

### Contributors

W. V. DeCamp, Frank H. Probert, W. Mont. Ferry,  
C. B. Lakenan, A. G. McLaughlin, Lester C. Uren,  
William Spry, Hon. William Sloan, A. Cressy Morris-  
son, George H. Cushing, McKinley W. Kriegh



## "Gentlemen, I Recommend Hyatt Bearings"

**W**HEN the man who best understands your mine haulage problems recommends Hyatt bearings he does so because he knows—

That Hyatt equipped cars require less power than plain bearing cars—50% less on level track.

That they effect a saving of 80% in lubrication costs because they require greasing only three or four times a year.

That they will give dependable service and will operate for years without bearing adjustments, repairs or replacements.

That they will enable you to produce coal at a lower cost per ton.

Accept his recommendation and specify Hyatt bearing trucks for your old and new cars. Most of the leading mine car manufacturers are prepared to furnish them.

Our new mine car bulletin No. 390 shows the Hyatt equipped wheel designs of twenty-seven mine car manufacturers. Write for a copy.

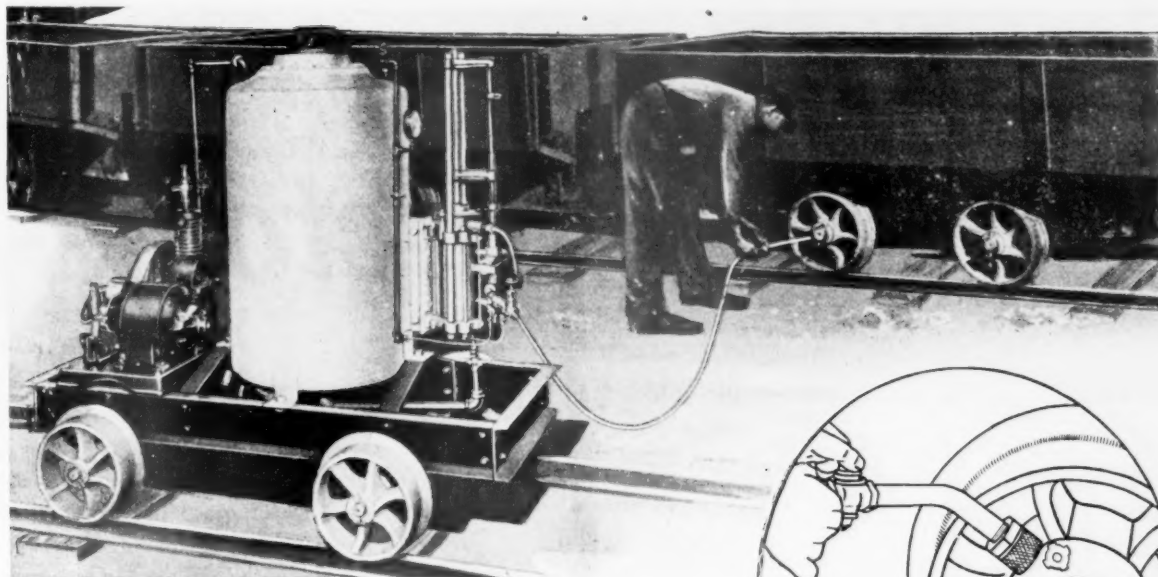
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WORCESTER PHILADELPHIA SAN FRANCISCO  
CLEVELAND MILWAUKEE DETROIT

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HYATT ROLLER BEARINGS FOR MINE CARS.

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## THE LINCOLN GREASING SYSTEM FOR MINE CARS

The Lincoln Greasing System is a mechanical method for greasing mine cars. A single operation automatically measures a predetermined amount of grease to go into a wheel or box and then forces the grease into that wheel or box under pressure.



Lincoln Self-Closing Spring Oilers (Fig. 1), are furnished as a part of the Lincoln Greasing System, for all types and makes of mine car trucks to replace present

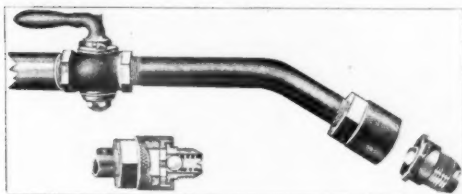


Fig. 2

plugs or oilers no matter where located. In combination with the Lincoln Coupler Nozzle (attached to hose line of greasing unit in place of ordinary nozzle) an absolutely leakproof and quickly detachable connection is provided.

The Lincoln Automatic Greasing Machine may be connected with your present air line or used with motor compressor unit, and is entirely automatic in operation.

THE LINCOLN GREASING SYSTEM makes the automatic machine greasing of your mine cars not only possible, *but the practical and economical way to do the job.*

With a Lincoln Greasing System you can grease your cars in a fraction of the time now required—at a greatly reduced cost for grease and labor—and with positive assurance that your cars have been properly lubricated. The *direct savings* in grease and labor costs alone easily pay for the system within a short time.

The *indirect saving* in having your cars positively and properly greased is even greater—for this means fewer repair parts and longer life for your car equipment.

Complete information and quotation on request. In writing please advise number of cars in service, number of each make or type, if possible, and how often you now grease your cars. Also state if you have air supply and whether A. C. or D. C. current is available.

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ST. LOUIS. U. S. A.

ALSO MANUFACTURERS OF LINCOLN SELF-ALIGNING JOURNAL BOX TRUCKS AND MINE CARS

**-an investment that pays over 100% every year**

# where the ore is refractory..

LAKE VIEW & STAR Ltd.  
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American Cyanamid Company,  
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Dear Sir:

Replying to your enquiry regarding the results obtained with Aero Brand Cyanide. I take pleasure in stating that it has given entire satisfaction in every direction.

I find that in cases where the ore is refractory this cyanide is most efficient and the precipitation by zinc leaves nothing to be desired.

Furthermore, we have obtained a considerable saving in cost, which constitutes a most important factor in our favour.

Yours faithfully,  
(Signed) H. E. Vail  
General Manager



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New York

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# THE MINING CONGRESS JOURNAL

DECEMBER, 1924

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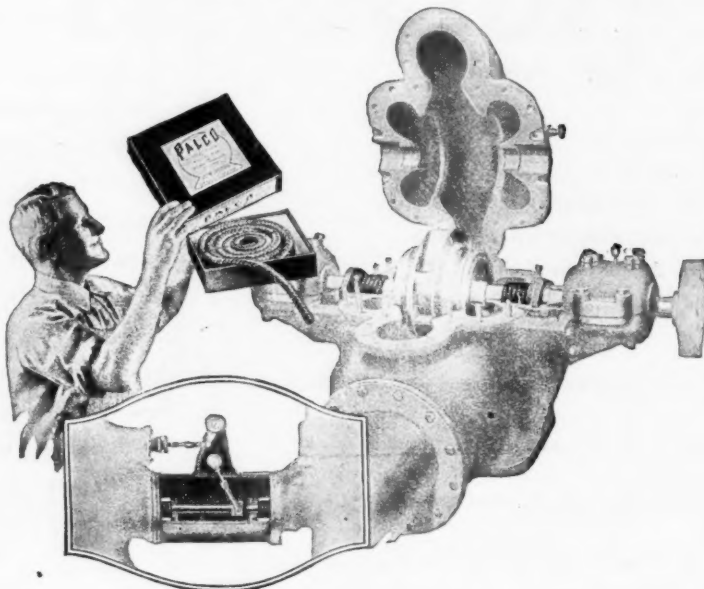
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## Don't Overlook the Need of Lubricant on a Fast Moving Pump Shaft



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"Palmetto"  
is to steam  
and  
compressed  
air

"Palco"  
is to  
hydraulic  
pressures



The centrifugal pump, because of its rotary movement and high speed, demands a packing that remains soft and supplies lubricant in sufficient quantities to keep the rod from wearing.

**SQUARE**  
**PALCO**  
**PLAITED PACKING**

has graphite grease lubricant forced hot under pressure into each single strand before plaiting, which keeps the rod in such a state of perfect lubrication as to prevent the wearing tendency of a shaft in a centrifugal pump.

### The Cost of Truing Up a Pump Shaft Makes the Packing Very Expensive

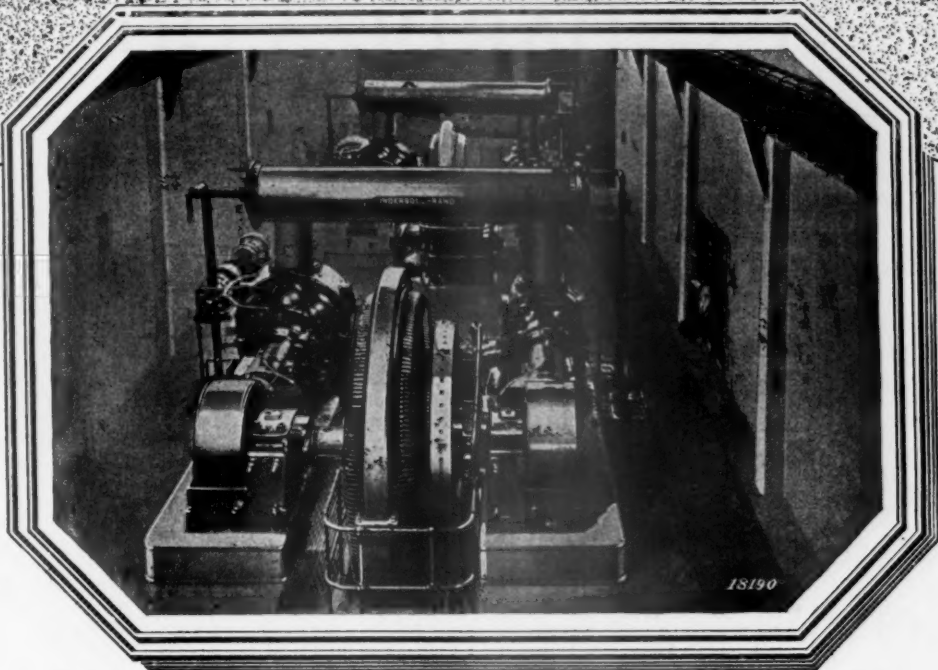
If you are having trouble with the packing in your centrifugal pumps let us send you a working sample of "Palco" to test under your own conditions—state size of packing you use—sample is free.

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*Sole Manufacturers*

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New York

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# Ingersoll-Rand

# STANDARDIZATION

## *Manufacturers' Cooperation*

---

The manufacturers of mining equipment do not stop at supporting the standardization movement—they are actively promoting it. What is to the advantage of the operators obviously is to their advantage, but it is gratifying to realize how strong this cooperation is in the movement that is so materially helping to put the business of mining on a better operating and economic basis. Something of the extent to which these men are interested may be understood by seeing how well they are represented on the various standardization committees listed on pages 28, 30, 31 and 32 of the advertising section of this issue.

The *National Standardization Bulletins* give the full annual reports of these committees. The principles adopted are effecting large savings for the many operators who have applied them.

Copies of the *Third* and *Fourth National Standardization Bulletins* (the last two) are still available. These may be obtained from the national organization at \$3.00 for the two. It is a small investment that brings enormous returns.

---

### THE AMERICAN MINING CONGRESS

841 Munsey Building

WASHINGTON, D. C.





Exterior view of Truesdale Breaker, Glen Alden Coal Co., Glen Alden, Pa. A 300-H. P. Morse Silent Chain, 2-in. pitch and 20-in. wide, 36-in. center to center, is used in connection with the main drive for the breaker. 493.4 to 119 R. P. M.

## 300 H. P. Morse Silent Chain connecting motor to main drive for the Truesdale Breaker

At the Glen Alden Coal Co., Glen Alden, Pa., which produces over 10 percent of the annual output of the anthracite field, as well as in thousands of other plants throughout the country, Morse Silent Chain Drives are depended upon for keeping production up to top-notch efficiency.

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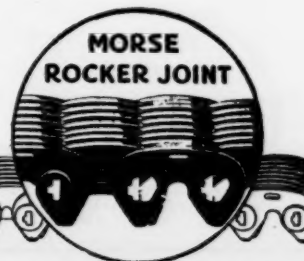
Any center distances can be used to suit the convenience of plant design. Morse Chains operate quietly at all speeds, without chattering, are elastic and flexible, and effectively absorb or cushion shocks and jars due to starting, stopping or sudden overloads.

Without obligating you in any way, Morse Engineers will gladly point out where Morse Silent Chain Drives will economize in your plant.

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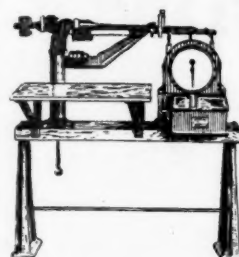
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Essential operating conditions are so simple that there is practically no place where much weighing is done that the Recorders cannot be easily and profitably installed.

Let us send you our attractive folder more completely describing the simplicity of installation and operation, as well as the names of mines near you where the Recorders are used.

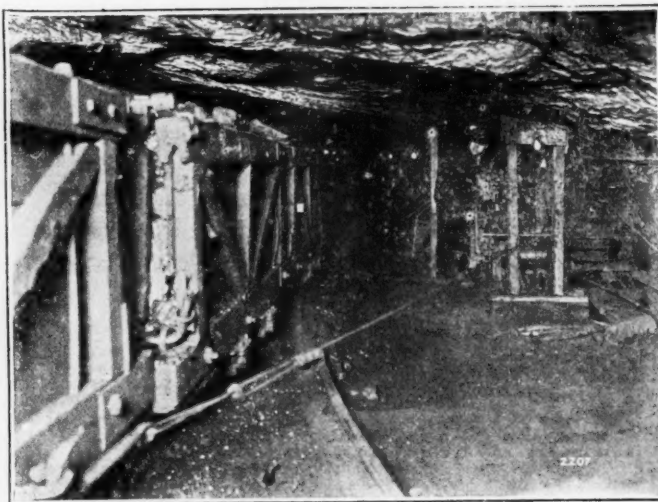
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### ELECTRIC AND STEAM



*Have proven their value in every class of mine work*

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It is the careful design of the complete hoist, and of each part, with ample strength everywhere to meet every working strain that makes

### The Lidgerwood the Best

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The *work* consists of saving power, of cutting lubricating costs, and of removing the necessity for frequent repairs to line-shaft equipment. The Timken Bearing, as the Dodge engineers will explain, was selected because it established *permanent* values in extended tests.

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We will be glad to send complete information.

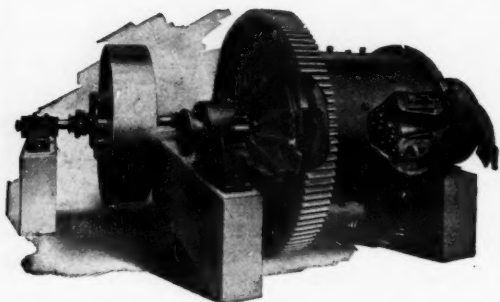
**THE TIMKEN ROLLER BEARING COMPANY**  
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*Tapered*  
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**Hercules Special No. 1** because of its high cartridge count and low cost per cartridge is more economical on work for which it is suited than other explosives. It frequently replaces 40% dynamite, cartridge for cartridge, at a saving of at least 25%. For quarrying, open pit mining, road building, and some underground work it is effective and economical.

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**Hercules Gelatin L. F.** with its improved low freezing qualities, and better fumes, is unexcelled for wet work, places with poor ventilation, holes with an upward slant, and for tight blasting in hard rock.

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# *The Roar of the Atoms!*

Schenectady, N. Y., Nov. 21

"The roaring of the atoms in iron as they are attracted by the magnet can be heard by means of a device recently perfected here."

THIS quotation is from an account in the morning papers of November 22, describing the perfecting in one of our great commercial research laboratories of a device by means of which the roar of atoms in a piece of iron when attracted by a magnet becomes distinctly audible. Another door into the mysteries about us flung open, firing our imaginations with the revelations that may lead us no one knows where.

Aside from the question of scale that inspires us here is the tangible revelation of the concerted action of the atoms as they work together to make our great natural laws and give them their irresistible force. Just as the united effort of the infinitesimal atoms gives us the great forces that awe and serve us, so united effort on the part of all concerned in any great movement makes that movement overwhelming.

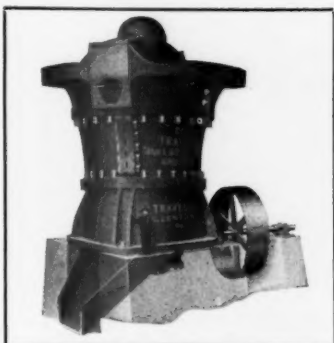
The American Mining Congress is an organization created from within the mining industry that all concerned in mining may, through a united effort, accomplish more effectually the prosperity of that industry. The majority of all mining enterprise in the country is identified with this organization whose accomplishment is so marked in the history of the progress made in this field. But it should have the support of everyone interested in mining. To more fully understand its purposes and scope, write to the organization headquarters in Washington. State the particular problems that have been confronting you.

***The* AMERICAN MINING CONGRESS**

841 MUNSEY BUILDING

WASHINGTON, D. C.

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BULLETIN 100-J ON REQUEST

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The positive force feed, tapered split head nut that eliminates thread stripping, the dust seal and the Hewes rigid non-weaving bar type spider are all exclusive features that make the Bulldog so reliable and economical.

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MINING CONGRESS  
JOURNAL* contains

A review of all national legislation of interest to mining; a discussion of mine taxation problems; a review of transportation matters; reports of Government Departments; Supreme Court Decisions; a series of articles on practical equipment problems; editorial policy that fully justifies the unprecedentedly wide quotations in the daily press.

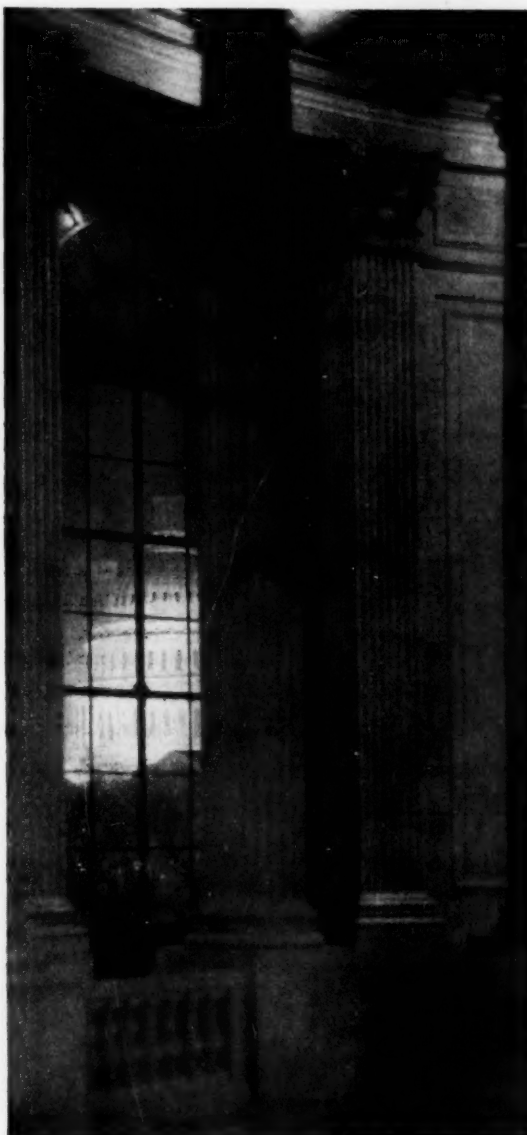


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Washington, D. C.

*The Official Publication of The American Mining Congress*



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AT THE SENATE OFFICE BUILDING





## Make every shot SURE!

You get sure-fire results with du Pont blasting accessories.

Many users of du Pont explosives have learned from experience that it pays in dollars and cents to use superior accessories in *every* blasting job. Your investment in explosives and labor is too great to jeopardize with any but the best accessories, particularly since their cost is comparatively small.

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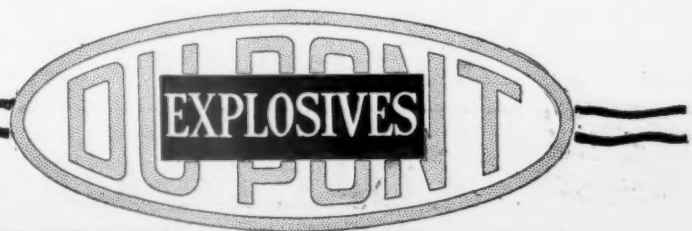
Du Pont Products Exhibit  
Atlantic City, N. J.

Blasting Caps	Electric Blasting Caps
Delay Electric	Fuse
Blasting Caps	Delay Electric Igniters
Blasting Machines	Rheostats
Galvanometers	Cap Crimpers
Leading Wire	Tamping Bags

Write for Blasting Accessories Catalog containing descriptions and illustrations of du Pont accessories and practical information about their use.

**E. I. DU PONT DE NEMOURS & CO., Inc.**

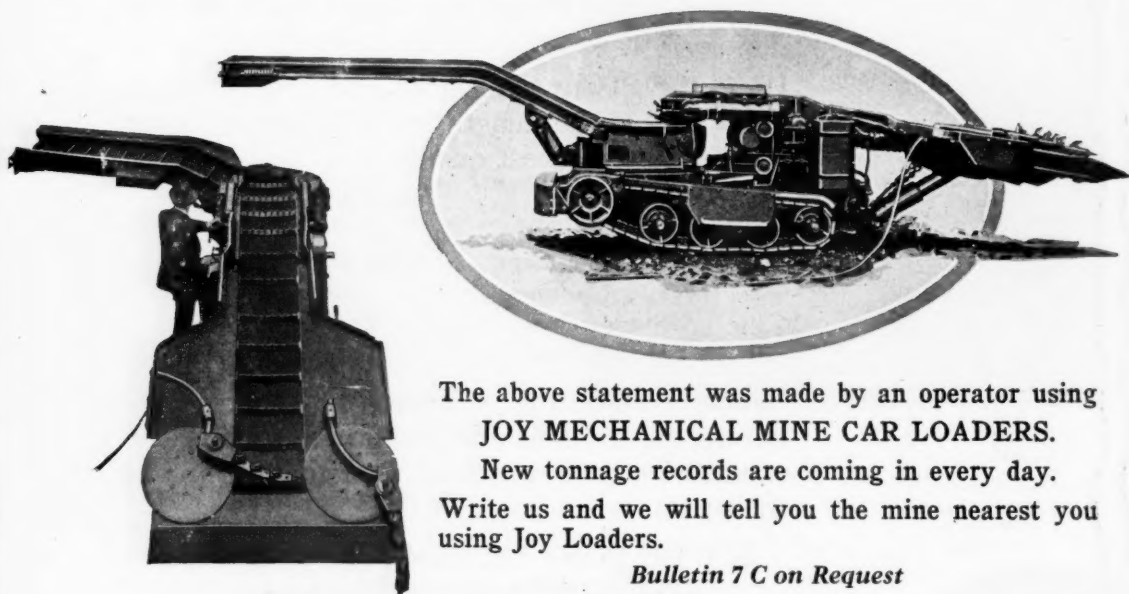
Explosives Department, Wilmington, Delaware



*A Large Southern Operator wires Us—*

**“Loaded 215 tons  
in six hours—**

**before we get through I will  
hang up record tonnage on  
any system of Loading and  
will do it on ROOM and  
PILLAR SYSTEM”**



The above statement was made by an operator using  
**JOY MECHANICAL MINE CAR LOADERS.**

New tonnage records are coming in every day.

Write us and we will tell you the mine nearest you  
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*Bulletin 7 C on Request*

**General Offices: PITTSBURGH, PA., U. S. A.**

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you will eventually*

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THE AMERICAN MINING CONGRESS

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VOLUME 10

DECEMBER, 1924

NUMBER 12

## ALLIED INDUSTRIES

**P**RESIDENT COOLIDGE in a recent speech declared in favor of the most favorable freight rates possible as a means of relief from the present depression of the farming industry.

The American Mining Congress, in a letter to the President, following this speech, pointed out that the mining industry is suffering an even greater depression than farming, and therefore is entitled to as much if not greater consideration. In explaining the position of the industry, the Mining Congress asserted that:

"In the making of freight rates special consideration should be given to all basic products (products in that form in which they are first offered for transportation). This principle as applied to mining products will increase the earnings of the railroads, decrease the cost of the product to the consumer, and at the same time aid the mining industry. Many mining products are by fabrication and refabrication shipped again and again to their markets, each time the more finished form justifying a higher transportation rate and at each reshipment adding to the earnings of the railroads not only by increased tonnage, but by those increased rates which justly apply to the finished and more costly product.

"The raw products of the mining industry in 1920 furnished 58 percent of the total freight tonnage moved by rail. In the same year, products of manufacture directly attributable to the mining industry constituted 11 percent of the total freight tonnage. The tonnage attributable to the mining industry in 1920, therefore, was 69 percent of the total freight tonnage transported by rail during that year. The average annual tonnage furnished by the mining industry during the last ten-year period was approximately 65 percent of the total tonnage. The freight rates on these basic products are now higher in proportion to their value than any other group of commodities shipped."

The Hoch-Smith resolution now pending in the Senate makes provision for an investigation that should eventually enable the Interstate Commerce Commission to establish a scientific rate structure, which admittedly does not now exist. This investigation should prove whether or not a proper and scientific relationship exists between basic commodities and the finished product taking higher class rates. We believe that this resolution should be so amended as to specifically cover both agriculture and mining as basic industries. The mining industry is less vocal and, in a general way, is willing to work out its own problems if left without interference and it only appeals for those conditions which, while serving the industry, also make for the betterment of conditions in the nation as a whole.

## THE ELECTION A STIMULUS

**T**HE aftermath of the election evidences a most reassuring and healthy revival of business and commercial activity. Perhaps the uncertainty, trepidation, and stagnation that seemed to exist during the closing weeks of the campaign were no more in evidence than in previous presidential campaigns; but the situation was abnormal. In many instances, industrial operations were curtailed or temporarily suspended, commercial orders were held in abeyance, and business transactions were postponed pending the outcome of the election. Now, in the place of doubt, there is certainty. Instead of suspicion, there is confidence. And stagnation is supplanted by a boom.

This sudden change in business conditions can not be ascribed solely to the fact that some sixteen millions of voters supported President Coolidge, while approximately only eight millions cast their votes for Mr. Davis. The election demonstrated the existence of a deep sense of loyalty and patriotic devotion on the part of the masses toward their government. Twenty-four million and more votes were cast for our system of representative party government. And therein lies the real reason for the sudden stimulation of business immediately following the election. The election results showed in a most decisive manner that the great majority of the American people have faith in their system of government—a faith that can not be shaken by the knowledge that a weak spot may exist here or there in the administration of some branch of the government.

During the next four years, it is predicted that there will be less loose-thinking among the leaders of so-called liberal thought. There will be less agitation against the existing order of things. There will be little opportunity for sinister propaganda to surcharge the political atmosphere with dangerous theories concerning the functions of government. The people have spoken. Their will has been made known in no uncertain way. They expect results. The efforts that have been made to reduce the public debt and taxes, to bring about accord and understanding among the nations of the world and to maintain peace, to punish offenders of society and government by the orderly processes of law, and to secure the highest development of the nation's resources by the protection and encouragement of private enterprise, have met with general public approval.

Twenty-four millions of voters voted to uphold Americanism—voted for American ideals and institutions of government. On November 4 they formed a phalanx about the Constitution, and pledged their faith in the fundamental principles of government that have made this Republic of ours great and our country a most desirable place in which to live and earn a livelihood. Their action at the polls constituted a mandate that their elected representatives, in conducting the affairs of gov-



ernment, shall be loyal to and abide by those fundamental principles. The people want good government, honest government, orderly government; but they indicated by their votes that they believe they have the fundamentals of the right kind of government in the Constitution of the United States.

### OUR PUBLIC LAND POLICY

THE late Judge Short, famous California jurist, delivered an address upon occasion, concerning our Public Land policy. In this address "Uncle Sam" was pictured as a father with four sons—East, North, South and West, and dealt largely with the youngest son "West" and his heritage of what was originally termed "worthless land." But West, being far sighted, offered the railroads thousands of acres of his land in return for the extension of their service into his domain.

We all are familiar with the success of that original profit-sharing plan. That success has since led to bitter criticism of the policy, and to the indictment by the Conservationist that the wealth of the nation is being dissipated, and that future generations will suffer unduly if the policy is continued.

But the fact remains that the great estate of "West" has not been wholly "squandered," and that under that policy has grown up the greatest nation on the face of the earth.

Between 1803 and 1853, Uncle Sam acquired 1,400,000,000 acres of land. There is today remaining in the Public Domain, 270,000,000 acres. In addition the government has reserved 161,000,000 acres in the forest reserves and 41,000,000 as mineral reserve; it has reserved for reclamation purposes, 15,500,000 acres; for water power sites, 2,500,000 acres, and more than 7,000,000 acres are reserved in National parks and Indian lands. The government retained 35,000,000 acres of coal lands, and its oil reserves are approximately 6,500,000 acres.

The question of just what policy shall be adopted by the government concerning these remaining public lands is now crystallizing. So far it seems to be adamantly against the policy that has builded this great nation—that of individual opportunity.

As indicating what attitude the present administration may take in the matter, we quote from a recent statement by President Coolidge:

"We hold the resources of our country as a trust. They ought to be used for the benefit of the present generation, but they ought neither to be wasted nor destroyed. The generations to come have a vested interest in them. They ought to be administered for the benefit of the public. Policies must be discovered, which will in the hands of private individuals and public officers, tend to further development."

The MINING CONGRESS JOURNAL has frequently reiterated its position on this question. It believes that past experience is concrete evidence that no self-governing and free people has ever permanently established and maintained a system of government landlordism, and that the success of the agricultural industry, the success of the mining industry, in fact the success of the nation, past, present and future, is due to individual ownership, initiative and enterprise. For one instance of the misuse of the liberal policy of our forefathers, we find thousands who have hazarded their all, and left to generations to come not only solid sources of livelihood but the great heritage of courage, perseverance and faith.

Would we have developed the great leaders in American life, the great industrialists of our time, under the guidance of a government bureau?

We are not advocating a spendthrift policy. We have, as a nation, reached full stature and must administer our great heritage wisely, but that wisdom should have for its backbone the courage of our pioneer forefathers.

### BAD MONEY

THE world has just witnessed a spectacle of the whole of Central Europe being jerked back shivering from the edge of an economic abyss, a debacle caused entirely by bad money. What is bad money? Obviously it is money which has neither sufficient intrinsic worth or reserve security to make it a medium of continuous circulation at a constant value. The whole work of the Reparations Commission has been and must be based on the replacement of bad money with good money, which obviously must be money which has sufficient intrinsic worth or reserve security to make it a medium of continuous circulation at a constant value.

For many years the standard of silver content in silver coinage of countries which maintain the leadership in world commerce has been fixed at .925 fine. There has been of recent years a lowering of this fineness in countries other than the United States to little more than half the former silver content. Unlike paper currency, it does not have the reserve to fortify its value. The immediate profit in seigniorage is large to the mint of the issuing country. The ultimate result is bound to approach a demonetization and depreciation of its value as a circulating medium, not so great, it is true, as in the issue of uncounted billions of paper money against no reserves, but certainly ultimately to the degree to which its fineness has been reduced. To that extent it becomes token money with an intrinsic value low in proportion to its stamped value and currency value. It is bound to have a disquieting effect on the people among whom it circulates. There has been a distinct division of opinion between those people who have supported the theory of token money and those people who have supported the theory of money based on intrinsic or reserve value. The economic developments of Europe have conclusively shown that whatever may have been said for the theory of token money, as a practical matter it is bad money.

### DISCRIMINATION AGAINST ENGINEERS

THE Board of Tax Appeals still refuses to admit engineers to practice before it. It still refuses to admit anyone, no matter how well qualified they may be to handle income tax questions, who does not possess a certificate in the legal or accounting professions. On the other hand, anyone who is the possessor of such a certificate may be admitted to practice, whether he knows anything about the income tax law or not.

The Board is composed of attorneys and accountants. As now constituted, it is opposed to the appointment of an engineer to its membership. Its attitude toward the engineering profession is objectionable, and there doubtless will be an unfortunate controversy over the matter when Congress meets. This will impair the Board's efficiency. But when trouble is invited, those inviting it should be prepared to accept its consequences. In this instance, of course, the taxpayers whose cases are appealed to the Board, will suffer temporary hardship regardless of the outcome.



## INEFFECTIVE REFORM

WHEN the World War was ended and when the post-war period of inflation had expended itself, it was realized that more than the necessary number of coal mines had been opened. Part of them had been created in response to the war need; part of them were inspired by the hope of profit from the inevitable post-war inflation. Regardless of the cause, it became known that there were more mines than could be supported by the peace-time demands. Realization of that fact started a demand for liquidation. And the need for liquidation inspired a reform movement. The latter came to a focus in the slogan, "Keep the efficient mines—destroy those which are inefficient." This alleged program of deflation has now been in progress for five years. At the close of a five-year test is a proper time to question whether the reform has been effective and whether the trade has been helped by the efforts of the reformers.

The fact is, of course, that a mine, once opened, always remains a mine until it has been worked out or destroyed. The reformers contemplated neither of these things. They knew that all of the mines could not be worked out quickly. They realized that to destroy the mine would make unavailable the coal which lay behind the openings. Therefore, the reformers headed toward neither the exhaustion nor the destruction of the surplus mines. Instead, they took the very highly intelligent method of leaving the mines intact—ready to be worked by whoever should come into possession of them—and to bankrupt their owners.

It was in the method employed to bankrupt the owner that the alleged reformers displayed their greatest lack of comprehension of economic problems. It happened that there were two groups of mines which dealt with their labor on two different and opposite theories. Approximately one-half of the mines employed miners only who were members of the Miners' Union. The other half of the mines employed only those who were not members of the union, and who agreed that they would not become such members. The reformers took the following interesting slant at that question. They proposed to give to the unionized miners all they demanded, or could get. In addition, they even encouraged the miners to ask for more. The interesting theory was that only the most efficient mines could afford to pay such wages and still sell the coal in competition with other forms of fuel. They thus provided a sort of Crusitan bed treatment for the mining industry, namely, that only those who could come up to impossible measurements should remain alive.

This might have worked reasonably well if it had not been that there remained another half of the mines which were not subject to that severe treatment. The nonunion half of the mines didn't have to pay these prohibitive wages and, in consequence, didn't pay them. The result was that while the half of the mines were closed down, the country still needed coal and patronized the other half of the mines. Thus, half of the mines came to the point of doing practically the whole of the business. Obviously, they had to expand their productive capacity in order to meet that demand. The net result was, then, that the unionized half of the mines had—but did not use—the same productive capacity which they had at the outset of the reform movement. The other half of the mines have had their productive capacity very considerably increased. Thus, the total productive capacity of the country has been increased directly proportional to the increased productive capacity of the nonunion mines.

The curious point is that the reform movement was instituted for the purpose of getting rid of part of coal's productive capacity. It ended by increasing that productive capacity. The net result, of course, is the reform movement has failed and the coal industry is worse off than it was in the beginning.

## AN ASSURANCE, NOT CHARITY

THE word "association" should be the most easily understood of all simple words. "Associate" really means to act together. "Association" means the place where persons act together to do the thing. The fact of community action doesn't prescribe, and certainly does not limit, that action. Therefore, given an association and a thing which properly can be done by associated action, the organization exists to do what is necessary.

The coal industry is confronted by the most serious problems of its existence. This stands proved on the face of things, because the coal industry is in the worst financial position it has ever occupied. Literally dozens of corporations, large and small, are becoming insolvent, indicating that the whole price structure needs to be revised. This is an industry problem which is not soluble by individuals acting alone but must come about through some form of associated action. Heretofore, coal has been carried mostly by railroads and railroad rates, admittedly, have become too high for the users of coal to pay. This is causing a translation of the power in coal into another form and the transportation of that power by other means than by steam railroads. That involves a complete readjustment of coal trade processes to meet the new condition. This, obviously, is something which can not be done by individuals, but rather requires associated action. Also, there are labor problems which involve, in final essence, nothing less than a need to discover a new basis for compensating men for their effort. This is a third question which can not be solved by individuals alone, but requires associated action. Finally, there is a need to appeal to the public for unusual consideration until these major problems of the industry have been worked out in orderly fashion. That, clearly, is not a case of individual action, but rather for men working through an associated group of some kind.

The rule which might be drawn to cover this case would be that when the problems become greater than individuals can solve, the need for an association becomes imperative. The more desperate the situation, the more need for an association.

If we accept the premise, viz., that the problems of the industry are the greatest in history, we must conclude that the need for coal associations is the greatest in history. Regardless of that obvious fact, we find that as coal men encounter financial difficulties and begin to retrench on their outlays, they begin at once to discontinue their association membership and their contribution to "the common cause." They either abandon association work altogether, or, to adopt a phrase now common, they reduce them to skeleton organizations. This, evidently, proceeds on the theory that associations are limited, *per se*, to one small kind of work. And that is the kind of work which the coal men want now to discontinue.

The implication in such a decision is that an association is something to be supported much as one would contribute to charity, or it is a luxury, to be supported and maintained only when the industry is in abundant funds; needs little or no help; and can indulge in a

small extravagance. The contrary, of course, is true. The associations are valuable only when there is a great problem to meet and something needs to be done which the individual himself can not do. Unless we wholly misread the signs of the time, the coal industry is now in one of those positions where nothing but association action can possibly meet its situation.

If coal men abandon their associations now they will take a place beside the man who sat in a boat during a drouth and jumped overboard when the flood was at its height.

#### A SOUND CONSERVATION POLICY

**T**HE necessity for conserving our timber resources has been given added emphasis by the President of the United States in his address before the National Conference on Better Utilization of Forest Products recently held in Washington. President Coolidge brought out potently the ominous fact that there is imminent danger in our timber problems, and said "we now have in all 745,000,000,000 cubic feet of timber standing; we are growing 6,000,000,000 feet a year, and we are consuming 25,000,000,000 feet a year." Therefore, by simple arithmetic, it is apparent that our timber supply will be completely exhausted in forty years unless there is immediate action.

The bituminous coal mining industry consumes annually 2,021,950,000 feet; the anthracite industry consumes annually 939,195,290 feet; and the metal mining industry consumes approximately 85,000,000 feet.

It would be worse than folly to ignore these startling facts, and the meeting just closed agreed upon a special effort to meet the situation.

There are many things to be considered as possible remedies. First, we must seriously consider the problem of reforestation, with its many ramifications, including the taxing of embryo forests by the states; second, serious consideration must be given to the use of timber substitutes; third, careful analysis and consideration should be given to the various means of preserving timbers already in use; and fourth, state and local governments must be induced to abandon confiscatory taxation systems that compel wasteful exploitation of timber reserves. The American Mining Congress has for three years been carrying on work along these lines through the Mine Timbering Sections of its Standardization Division and its Tax Division, giving special thought to taxation of wasting industries, wood preservation, substitutes, such as steel, concrete, etc., simplification of sizes and grades of timbers, and more economical methods of timbering. These committees already have done splendid work and will, within the next six months, make recommendations to the mining industry that will be of material assistance in solving the problem, at least so far as mining is concerned.

Action is imperative. The invaluable timber resources of this nation must be perpetuated. Prompt, efficient and intelligent cooperation is the only means necessary. The more vigorous the plan the more certain the results.

#### PROSPECTORS' RIGHTS CHAMPIONED

**U**NDER the stock-raising homestead act of 1916 minerals are reserved to the United States, and the right to prospect for mineral deposits on lands classified as valuable chiefly for grazing purposes may be granted to anyone who may find such deposits. Time has proved, however, that this law is seriously interfering with the work of the prospector. Homesteaders, who now control millions of acres of grazing

lands, are loathe to permit the prospector to enter upon these lands to search for minerals which may or may not be found there. Prospecting, therefore, is made difficult, and many prospectors have been forced to abandon their efforts in preference to engaging in bitter controversies and costly litigation in the courts with stock-raising homesteaders.

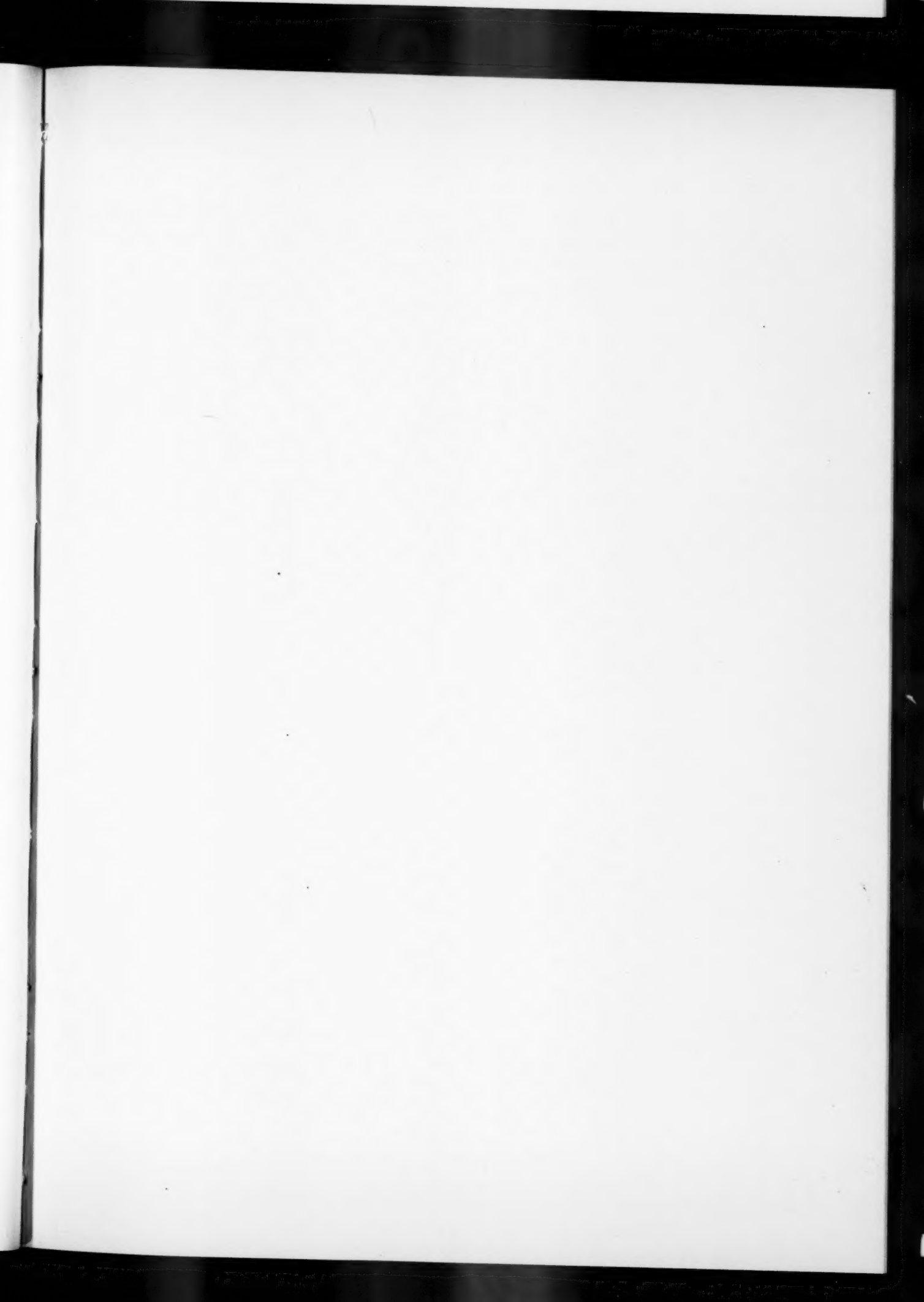
Inasmuch as the minerals that may be found on stock-raising lands are reserved to the government, it is clear that Congress did not intend to discourage prospecting on such lands. The American Mining Congress Division of Public Lands has been making a careful study of the situation in order that proper amendments to the public land laws might be formulated which will, if passed, protect bona fide prospectors who desire to enter upon and prospect, without interference with the surface rights of the homesteader, any portion of a stock-raising homestead. Prospectors should be given a reasonable time within which to prove the existence or non-existence of minerals, both on these stock-raising lands and on lands within the forest reserves that have been leased for grazing purposes. It is in the public interest to encourage the prospector in his search for precious metals. It is the duty of the Federal Government to protect the prospector against interference while lawfully engaged in the business of prospecting.

#### THEORY AND PRACTICE

**T**HE new income tax regulations throw little light upon many important provisions of the 1924 revenue act. This means that many new and vexatious questions, arising under this law, will not be finally settled until test cases have been passed upon by the Federal courts. As in the past, under prior laws, the interpretation of the law will be accomplished through tedious and expensive litigation. And in the meantime, taxpayers will suffer from conflicting opinions of administrative officials, and the uncertainty as to the final outcome of appeals to the courts will hamper business and will tend to discourage industrial expansion.

THE MINING CONGRESS JOURNAL holds that intelligent lawmaking is the only solution for income tax problems. Entirely too many provisions of the present law, as well as prior laws, have been based upon theories and not upon a practical working knowledge of the subjects to which they are applicable. When theory, instead of practical experience, governs the language of the law, there is little hope for simplification. A complex law requires complex regulations for its administration. The regulations are unsatisfactory because the law is unsatisfactory and difficult to fairly administer.

The law must be simplified or the administrative machinery will continue to be clogged with disputed claims. A special committee of the Senate is investigating the Income Tax Unit for evidences of irregularities and inefficiency. The Unit probably will be blamed for much of the dissatisfaction that exists among taxpayers. But most of the trouble encountered in administering the revenue law is not due to inefficiency on the part of the Unit, but to intricacies of the law. If Congress will enact a law based upon the practical experience gained in administering the present and prior laws, leaving out ambiguous terminology and phraseology, and recognizing the common honesty of taxpayers regardless of class or station in life, it will go far in restoring public confidence in the equity of income taxation and in the possibility of impartial enforcement of the law and regulations.





National Photo

Where Lies the Unknown Soldier

*The tumult and the shouting dies ;  
The Captains and the Kings depart :  
Still stands Thine ancient sacrifice,  
An humble and a contrite heart.  
Lord God of Hosts, be with us yet,  
Lest we forget !*



## THE NEW INCOME TAX REGULATIONS

*While Regulations 65 Promulgated By Revenue Commissioner Involve Few Changes, They Are Important—Changes Pertaining To Discovery Of Metal Mines And Reorganization Are Of Special Interest To The Mining Industry*

By MCKINLEY W. KRIEGH

THE new income tax regulations (Regulations 65) embody few important changes, except those made necessary by the Revenue Act of 1924. The several articles dealing specifically with mines and oil and gas wells involve little new matter except in those pertaining to distribution from depletion reserves, the basis for determining gain or loss, depletion, and depreciation in the case of property acquired prior to March 1, 1913, the basis for determining the depletion allowance based on discovery value, and the definition of a "new mine" under the article dealing with discovery of mines.

The articles dealing with reorganizations will impose upon taxpayers, who are affected by the reorganization provisions of the 1924 law, many weary hours of study and many weeks and months of uncertainty while controversies with the department and litigation in the courts are in progress in order to determine the validity of these new provisions and the scope of their application. For, as has been pointed out repeatedly, these provisions are retroactive in that they deny to the taxpayer certain benefits that were derived from the consummation of transactions prior to the passage of the 1924 Act.

### MINE VALUATIONS

The articles that govern the determination of values in the case of property acquired prior to March 1, 1913, are practically the same as the previous regulations. The only change of especial importance is that which was made necessary by section 204 (b) of the act, that "the term 'basic date' indicates the date of valuation, i. e., March 1, 1913, in the case of property acquired prior thereto, if the cost was less than the fair market value on March 1, 1913; the date of acquisition in the case of property acquired on or after March 1, 1913, or, in the case of property acquired before March 1, 1913, if the cost of such property was greater than its value on March 1, 1913, or the date of discovery, or a date within thirty days thereafter, in the case of discovery." (See Article 201, Regs. 65.)

There have been many cases where cost of property was greater than the March 1, 1913, value allowed by the department. In these cases the taxpayers are entitled to deplete their mines on the cost basis. An effort may be made to deny them the benefit of the additional value allowable for future depletion due to the fact that depletion allowed during

prior years on the lower March 1, 1913, basis, did not restore an amount adequate to return the cost of their properties.

### REORGANIZATIONS

As was predicted in a previous article on the 1924 Revenue Act, the new regulations throw little light on the effect of the reorganization provisions, beyond the explanations given in the reports of the House Ways and Means and Senate Finance Committees. The regulations merely quote the law, and cite illustrations similar to those given in the committee reports. (See Articles 1596, 1597, 1598, Regs. 65.) Consequently, as was stated in the October number of this Journal, the final interpretation of these provisions of the law and regulations awaits the final decision of the courts in test cases.

In cases of corporate reorganization where property is transferred to the new corporation and immediately thereafter an interest or control of 80 percent remains in the same persons or any of them, the new corporation is not permitted to set up for depletion, depreciation, and gain or loss purposes any greater value than that allowed to the predecessor corporation.

This would not impose any particular hardship upon the taxpayer if it were not for the fact that the provision applies to all past transactions of this character made since December 31, 1917. And, as we have pointed out in previous articles, this does great injustice to stockholders who, during 1918-1923, bought stock in the reorganized company on the basis of depletable asset values, shown on the books at the time the stock was purchased, and who now are compelled to take a reduced capital return through depletion, that will not restore their investments as represented by the cost of their stocks.

The regulations point out that in cases where 80 percent interest or control does not remain in the same persons, such a transaction falls within the provisions of Article 1598 (Section 204 (a) (8) of the Act), in which event the transaction could not be disturbed if it happened prior to December 31, 1920. Thus, there is a clear discrimination between taxpayers who reorganized in the manner described in Article 1597, during the period from January 1, 1918, in-

clusive, and those who reorganized in the manner described in Article 1597, during the same period.

It should be noted that these retroactive provisions might have been defeated if taxpayers who are affected had made vigorous protest when the bill was pending in Congress. The American Mining Congress filed protest and briefs with committees of both the House and Senate, and was informed that taxpayers were not concerned as no other protest had been received. The fact was that taxpayers did not realize the true nature of these provisions. But the fight is not over.

### DISCOVERY VALUE

Article 220 deals with discovery of mines. Paragraph (g) contains new matter of importance to metal mines. A "new mine" is defined as "one or more separate new ore bodies which have not been and could not have been included in any prior valuation. The value of a new mine will be limited to its value to a prospective purchaser who would require mine-openings, plant and equipment, and other facilities independent of those utilized in working other mines in the vicinity, and who would exhaust the new mine at a rate commensurate with such independent facilities."

This means, of course, that the department will allow discovery value where it is clearly shown by the taxpayer that a new ore body has been found that is not an extension of a known ore body. Herebefore, an attempt was made to establish the rule that where a new ore body was discovered by exploration and development through the workings of an old mine or an existing operation, this new ore body constituted an extension of the old mine. The new rule recognizes discovery where the new ore body is separated, irrespective of whether or not the discovery was made as a result of surface prospecting and exploration, or prospecting underground through old workings.

The regulations do not allow discovery value in a case where newly discovered ore is not separated from previously known ore bodies, even though, in valuing the original ore bodies, the department had denied the existence of probable or prospective ore the existence of which is proven by discovery and development. In such a case the new tonnage is added, by the department, to the tonnage allowed in the original valuation, without the addition of the value represented in this tonnage, and by this means the tax-

(Continued on page 571)

## THE PROBLEMS OF AMERICAN SILVER PRODUCERS

*Mr. Ferry Believes That The Problems That Confront Silver Are Quite Similar To Those Confronting Every Other Branch Of The Mining Industry—In This Article He Outlines Some Of The Proposed Remedies And Particularly Discusses The Newly Organized American Silver Producers' Association*

By W. MONT. FERRY\*

**I**N general the problems which confront the silver producers are much the same problems which the producers of gold, copper, lead and zinc are obliged to meet. They are part of the business of the mine operator and are necessarily familiar to the members of this conference of miners.

It would be profitable to discuss these problems—to compare mining methods, costs of supplies and materials, labor, organization, marketing methods and administration. Each one of these factors which together make up the whole problem is well worth critical study in the light of the varied experiences of individual operators. However, the occasion and the circumstances suggest that you want to learn something of the purpose of the American Silver Producers' Association rather than to discuss those other problems, important as they are. Therefore I will outline our purpose and the circumstances which crystallized our vague ideas into united action.

The American Mining Congress at its 1922 convention took cognizance of the fact that the mining of gold and silver has declined during a considerable period until it had reached a point where serious economical questions were involved. A committee was appointed by the President of the Congress. In addition to other activities of a constructive nature, this committee was in part responsible for the introduction of a bill in the United States Senate by Senator Nicholson of Colorado which created the Senate Commission of Gold and Silver Inquiry. The powers and duties of this commission under the bill creating it, which passed in the early months of 1923, were extensive. Generally, the Committee was charged with inquiring into the causes which had led up to the deplorable condition in the gold and silver mining industry; to investigate the curtailment of the use of these metals, especially silver, not only as money, but also as a commodity.

This splendid and aggressive Commission, of which Senator Nicholson was Chairman until his untimely death, and whose place is now ably filled by Senator Oddie, is composed, in addition to its chairman, of Senators Pittman, Walsh, Gooding and Sterling.

The very remarkable accomplishments of this Commission require no encomiums from me. Their work, not yet complete,

is and will continue to be a monument to their ability, industry and broad vision. Every mining man, indeed every well wisher of his country, should know and appreciate the tremendous importance the work of this Commission has assumed and should give to this work and to those who are conducting it whole-hearted and enthusiastic support.

Having outlined its work and having secured a mass of information, the most comprehensive, accurate and detailed that has ever been compiled, the Commission called a conference of the United States silver producers at Reno for September, 1923.

At that conference was represented over 80% of the silver production of the United States. There were also present representatives whose production amounted to a considerable portion of the Mexican output.

Very few of those present at the Reno Conference understood the purpose of the meeting. Most of us were there to learn and to listen with critical ears to what would be suggested. Suspicion and uncertainty were in the air. It was a meeting, perhaps the first, at which were gathered producers, smelters, refiners and marketers of silver. It seemed improbable that unity of action could crystallize from counsel and suggestions emanating from such diverging and perhaps antagonistic sources. The saving elements in the situation were the intelligence of the participants and their earnest desire to undertake some constructive plan to benefit the industry.

The members of the Senate Commission, led by Senator Oddie, outlined very definitely the purposes and results of their inquiry and made valuable suggestions to the Conference. Representatives of the great smelting companies clearly and forcibly indicated the situation as they viewed it, offered important suggestions, and committed their organizations to the common cause. The atmosphere was cleared, suspicion subsided, intelligent interest was aroused, and the general line of action was quickly determined.

The Reno Conference directed its Chairman to appoint a committee on permanent organization; to investigate the administration of the so-called Pittman Act by the Treasury Department; to ap-

point a committee to investigate the feasibility of forming and operating a Silver Export Association under the provisions of the Webb-Pomerene Act; to investigate marketing methods; to inquire into the present users of silver in the arts, industries, and as money. In short, this last committee, later known as a Fact Finding Committee, was to make such inquiry and investigate such questions as in its judgment seemed wise and profitable. The Chairman of the Reno meeting was to re-assemble the Conference in Salt Lake City when these committees were ready to report.

It is apparent that the members of the Reno Conference were determined to follow the general suggestions of the Senate Commission, learn what they might through the investigation of these committees, and be prepared when the Conference should be re-convened to act definitely upon such recommendations as might be presented.

The Reno Conference was significant, as the brief outline given indicates; its chief significance being perhaps that all those interested in the silver industry, from the producer to the marketing agency, both included, were earnestly trying to find a common plan to benefit the entire industry.

It became certain soon after the Conference adjourned that such activities as might be undertaken should be confined to the interests within the United States, although sympathetic and aggressive co-operation was assured from Canada, Mexico and South America. This co-operation it was deemed, while invaluable and indispensable, must of necessity come after definite plans were formulated under our own national jurisdiction.

After deliberation and consultation, the Chairman of the Reno Conference appointed the Organization Committee and the Fact Finding Committee. With the personnel of these committees you are no doubt familiar. This personnel guaranteed to the industry that intelligence, vigor and sincerity would be applied in the prosecution of the work. The Organization Committee completed its work after a series of meetings and was ready to report. The Fact Finding Committee met in New York and later adjourned to Washington. The members of the Senate Commission met with this Committee, as also did producers, manufacturers, competent lawyers, international bankers and other experts in various

\*Silver Coalition Mines, Salt Lake City.

lines of activity intimately connected with the industry. There was also present the Executive Secretary of the American Mining Congress, who participated in the meetings. Special and careful preparation for this meeting had been made by the New York members of the Fact Finding Committee so that work was facilitated and information of unquestioned authenticity was immediately available. A report was subsequently formulated. This Committee, whose advice the Reno Conference Chairman had asked, employed former Senator Chas. S. Thomas of Colorado to investigate and report upon the legal aspects of the administration of the Pittman Act by the Treasury Department. The head of the United States Bureau of Mines, the Secretary of the Interior, and the Secretary of Commerce gave this Committee earnest cooperation and valuable suggestions.

In August, 1924, at the call of the Chairman, the Silver Conference re-assembled in Salt Lake City for the purpose of listening to the reports of its committees and of determining its course of action in the light which those reports would give. Many of you here present attended the Salt Lake Conference and will agree, I am sure, that it was a complete success. Over 95% of the silver produced in the United States was represented and every action taken was unanimous. There were present besides the producers, smelters and refiners, members of the Senate Commission with their expert statisticians, economists and engineers, representatives of the Bureau of Mines and other governmental activities, the Executive Secretary of the American Congress, and a number of other able and distinguished men whose interest had been enlisted.

The report of the Organization Committee was presented, critically examined, discussed and unanimously adopted. Its outline and purpose will be discussed for your benefit by a member of the committee which presented it, who is now the permanent Secretary-Treasurer of the organization.

Senator Thomas reported that the terms of the Pittman Act had been transgressed, certainly to the extent of fourteen and a half million ounces of silver, and probably to the extent of the amount of silver in twenty-nine million silver dollars which were exported to the Orient under the terms of the Pittman Act and which have not been restored to the United States Treasury.

The Fact Finding Committee submitted its report. Discussion amplified the report, which was unanimously adopted, and which outlined the Committee's suggestion for constructive work. This report recommended that no present action be taken in the formation of an Export Association because of the legal

uncertainties. It was recommended, however, that this matter be referred to the Executive Committee of the permanent organization and that this committee investigate the subject further before final action be taken. It was recommended further that new uses of silver in the arts and industries be sought and to that end extensive research work be done. Furthermore, it was recommended that continuous contact be kept with the Federal Government or its de-



W. Mont. Ferry

partments with a view of enlisting action toward preventing the further debasing and disuse of silver in foreign countries, and so far as possible advocating the restoration of silver to its former monetary position, but not in the last matter going into the question of bi-metalism.

For these various activities, world-wide in their ramification, ample funds will be necessary and the most expert and competent advice must be secured.

The foregoing brief outline of the genesis of this modern silver movement should be convincing that it is based upon a solid foundation and proposes to accomplish, if accomplishment be possible, certain very definite and sane results. A discussion here, led by members of the Fact Finding Committee, and by others who have attended both the Reno and Salt Lake Conferences, will amplify the outline which this brief paper gives.

Be it remembered that those engaged in this serious business of planning and carrying out measures to benefit the silver industry are sane and experienced men. They have no illusion respecting the difficulties to be encountered nor are they unmindful of the slow, painstaking and patient labor necessary to ascertain vital facts before beginning a constructive program.

It is significant that now, perhaps for

the first time, there is unity of purpose among producers, smelters, refiners, marketing agencies and manufacturers of the white metal. Heretofore, it cannot be denied, suspicion characterized the relationship existing between the various branches of the silver industry.

The American Silver Producers' Association proposes to use well established agencies existing in the business, amplifying or curtailing the activities of these agencies as investigation and experience may determine. It is not proposed to oppose the machinery which has been built up through the years and which operates throughout the world. Foreign exchange, international banking, international policies, both political and economic, are all involved in this great question. It is the purpose of this organization to study in detail, through competent experts, the various phases of this problem and, if possibly, to bring about cooperation and development along constructive lines. It is also proposed to invite the assistance and active cooperation of producers of Canada, Mexico, and South America, so that the Western Hemisphere, where silver is produced, may have the controlling word in the development and maintenance of this important industry.

Such are some of the purposes of the Association. Its members have no illusions as to the difficulty, expense and hard work involved. Some of the purposes may fail; conditions and antagonistic influences may be too strong. This much is certain, however; the controlling facts concerning this great business will be learned. A more orderly and less expensive marketing program will be adopted; the uses of silver in the arts and industries will be increased, and the monetary use of the white metal will be promoted. That this last is not a dream is evidenced by the very recent re-entry of Poland, Germany and other central European countries into the market to purchase silver in order that they may rehabilitate their monetary system. Those interested actively in the movement for which the American Silver Producers' Association stands were important factors in arranging that these European countries could secure silver for their monetary needs.

Finally, let it be understood that there is no disposition on the part of the members of the American Silver Producers' Association to in any way discredit or minimize the constructive work already done by the American Mining Congress. We are mindful of the importance of the Congress in the mining world and are fully cognizant of its intelligent and helpful efforts on many hard fought fields. We expect confidently the support and cooperation of this Congress in our future efforts as we have certainly had

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## COAL INFORMATION WHICH MISLEADS USERS

*General Statistics Are Used To Influence Prices When Buyers Cannot Have Access To The Productive Capacity Disclosed—Factors Which Determine Prices*

By GEORGE H. CUSHING

THE question which grows in importance in my mind is: Does the spread of general information about the coal industry relieve or complicate the merchandising job in coal?

Of course, that is only a personal opinion. And that element was introduced into the first paragraph because I do not know whether anybody will agree with me and therefore I do not want to commit anyone except myself to it.

Furthermore, it is entirely possible that the most generous spread of this general information has undoubtedly improved the relations between coal and the public. Also and in spots, it may even have influenced certain operating and financing policies to the great advantage of the operators by saving them money. Furthermore, this information has proved great material for the makers of speeches; that has some value. The desire to collect this information has kept alive many a local association which, by being alive, has served many a useful purpose. That alone is of great value. Those questions are here left wholly out of consideration, while the discussion centers itself on: Does the spread of this general information complicate the marketing problem, and did it, perhaps, accelerate the downward plunge of prices? Thus, for the moment, all the lovely aspects of fact finding are put on the shelf while the dollar and cents outcome is dissected and analyzed.

One of the most common of the general statements made about the coal industry is that there exist 14,700 bituminous mines, whereas the most extravagant estimate of need could not justify the existence of more than 6,000 mines. What I want to know is: Does the statement and reiteration of that fact help the mines sell coal at good prices or does it make difficult the sale of coal even at a loss? To answer that question we must borrow, for the moment, the brain of the average purchasing agent. That one statement of fact when it goes to the consumer means to him only that 8,700 wholly useless and needless mines are in existence and are trying, daily and hourly, to do business. The consumer thus gets a stranglehold on the opinion that there are two and a fraction mines for every one that is necessary. Therefore, he concludes, there are two and a fraction tons of coal available to him for every ton which he actually consumes. If he is possessed of even the average of intelligence and

of any reasoning faculties, the user automatically and naturally reaches the conclusion that two and a fraction persons are competing to do the job which one person can easily do. He then comes to believe that the old and familiar law of supply and demand will knock the price down to a point where somebody is going to be eliminated from the trade through the bankruptcy court. The consumer, being of that opinion, doesn't expect to pay even the cost of production for the coal which he gets. He expects—and with excellent reason—to pay that cost of production less what the efficient producer can afford to lose in order to wipe his inefficient and unnecessary competitors out of existence. Thus, a general spread of this information—and speaking solely from the standpoint of mob psychology—must have the effect of teaching the consumer that he may get the other fellow's coal with part of the owner's capital attached.

Of course, if the information thus spread is true, no purpose would be served by trying to conceal it; no damage would be done by spreading it broadcast. A fact is a fact and will become known in time. However, there is a very decided question whether such figures as those just quoted, in any sense, represent the true prospect of the buyer of coal. That is, these 14,700 mines are spread all over the United States. They are now located in some twenty-eight coal-producing states. From these widely scattered and isolated locations they shoot their coal into the immediately surrounding markets. A coal mine is a local thing. Coal demand is surely local. These days, freight rates are a tremendous factor in anybody's business. Therefore, it is not all true that all of these 14,700 mines are available to all of the coal users of the nation. They could all be available to all users only if coal rates were, like the price of postage stamps, so much per ton for delivery anywhere in the nation, and if coal could thus move from any mine to any point. However, coal rates are not quoted on a unit basis. Therefore, only relatively a few of the many mines are available to serve the consumers of any community. Each coal mine thus has a known radius over which its produce can be shipped. The national figure, therefore, as to mere numbers of mines, is misleading, unless

those mines are so located that every section of the market is served by its exact proportion of the total. That means to say that unless each consumer has consistently at his command two and a fraction tons for each ton of his annual consumption, the figures are wholly misleading and of no possible influence upon his prices.

There is another phase of the same question about which it is easy to have misunderstanding. The vast number of mines and the vast productive capacity of the country can have a direct influence on the price to the purchaser only if those mines are inter-connected and inter-dependent, so that he can sign a contract or make a commitment with one of them and draw his supply at will from practically all of them. That is not the case. Instead, all relationships in coal, as in other things, are purely personal. A buyer, if he is intelligent, relies upon one or, at most, a few sellers. If in this close trading, the buyer could have access to all of the excess productive capacity of even his own district, the excess productive capacity of that district would have great significance to him. That is not true in any circumstance. Therefore, even the influence of the excess productive capacity of a district is purely psychological.

Trade relationships, however, are even more narrow than that indicates. Every coal-consuming plant of the United States has its own peculiar minimum cost of producing a thousand pounds of steam. This irreducible minimum cost is dependent on the use of one particular coal—that which burns best in that plant and which is moved at the lowest available freight rate. To an extent, therefore, every coal-consuming plant, if it is to be efficient, is naturally and perforce the customer of one particular mine or group of mines. Of course, the owner of that power plant can use many other grades of coal to some advantage. He can, if he wishes, patronize other mines or groups of mines. He may, if he pleases, buy promiscuously and try to use indiscriminately all coal that is offered to him. Thereby he may save, occasionally, a few pennies per ton on the price of the coal he buys. But, it is much like buying a suit or a pair of shoes that is far too big merely because the price is low. The only sure result is a misfit. Indeed, the user may lose so much in the efficiency of his plant as to turn his seeming saving into

(Continued on page 571)



## THE MINING INDUSTRY AND THE GENERAL LAND OFFICE\*

*In Order That The Mining Industry Should Be Dealt With Fairly And Justly The Laws Enforced By The Land Office Were Promulgated—Their Relation To The Industry Is Discussed And Analyzed In The Following Article*

By WILLIAM SPRY†

At the outset let me say that production and distribution lie at the center of all industrial effort. Statutory provisions, either Federal or State, will never produce an ounce of gold or ton of coal. Congress may legislate, and the Executive administer, but applied industry alone giveth the increase. Yet for the orderly dispatch of business, either public or private, that all shall be dealt with justly, and with equal opportunity to all, some stated rules of action are a matter of necessity. Law and order lie at the foundation of our economic structure. Hence it will not be amiss for us to turn our attention briefly to the course of action heretofore adopted by the National Congress in dealing with public mineral lands, prior to the discussion of the possibilities of future legislation in this field, a subject given a prominent place in this conference.

The primary conception of Congress in dealing with the public lands was the realization of the largest possible cash return for their sale, to meet the immediate necessities of national enterprise. The General Land Office was organized in accordance with this conception; practically a real estate agency acting for the United States in the sale of its public domain. Under the statutory provisions enacted in 1785 and 1796, and by the act of May 10, 1800, the conversion of public lands into cash funds was, in brief, the Congressional definition of the powers and duties of the General Land Office. But this policy in the general disposition of our public lands did not include mineral lands, for the Government from its inception has made special provision for the disposition of its mineral wealth.

In ordinance of May 20, 1785, it was provided that in the survey of lands, all mines, salt springs, salt lakes and mill sites should be duly noted by the surveyor, and further, that in the sale of such lands "one-third part of all gold, silver, lead, and copper mines within the same" should be excepted and reserved for future sale or disposition.

The act of March 3, 1870, reserved all lead mines in the Territory of Indiana and authorized leases thereof, the act of March 3, 1829, authorized the sale of reserved lead mines in Missouri, while the preemption act of September 4, 1841, provided: "That no lands on which are situated any known salines or mines shall

be liable to entry under and by virtue of the provisions of this act." Again, the act of March 1, 1847, to establish a land office in the northern part of Michigan, and to provide for the sale of mineral lands in Michigan, directed a geological



Commissioner William Spry

survey and examination of the lands, and authorized the sale on special terms of lands containing "copper, lead, or other valuable ores." The act of March 3, 1847, dealt in similar terms with the mineral lands in Wisconsin. As a special indication of this policy of Congress it adopted a Joint Resolution January 30, 1865:

"That no act passed at the 1st Session of the 38th Congress, granting lands to States or Corporations, to aid in the construction of roads or for other purposes, or to extend the time of grants heretofore made, shall be so construed as to embrace mineral lands, which in all cases shall be, and are reserved exclusively to the United States, unless otherwise especially provided in the act or acts making the grant."

This resolution in fact was adopted for the reason that there was then pending before Congress the legislative measure that ultimately took form in the act of July 26, 1866, which made provision for the disposition of mineral lands. Congress July 4, 1866, in making a grant of

lands to the State of Nevada, declared that:

"In all cases lands valuable for mines of gold, silver, quicksilver, or copper shall be reserved from sale."

A provision which as codified in Sec. 2318 of the Revised Statutes, appears in this form:

"In all cases lands valuable for minerals shall be reserved from sale, except as otherwise expressly directed by law."

This policy of reserving mineral lands for disposition under specific provisions of law has been the subject of many decisions of our higher courts and of the Interior Departments and was fully discussed and recognized in the decision of the U. S. Supreme Court in the case of Sweet against the United States, 245 U. S., 563. This was a case involving a school grant to the State of Utah, and, inasmuch as the grant did not in terms except mineral lands therefrom, it was contended by the State that lands of that character were included within the grant, but the court after a very lengthy and comprehensive citation of early statutes, and uniform decisions of the courts and Department, refused to recognize the claim of the State, and held that, although mineral lands were not in terms excepted from the grant to the State of school lands, nevertheless, in view of the settled policy of Congress they were in fact excluded therefrom.

The various grants made by Congress to States and corporations in aid of the construction of railroads, all in terms have excluded mineral lands from the operation of such grants; and the courts have held that it is not sufficient for the land department in the issuance of a patent to simply say that mineral lands are excluded therefrom, but that it is incumbent upon the Department to ascertain and determine for itself whether the lands claimed under the grant are subject thereto. In consequence of this legislation and the holding of the courts, the adjustment of State and railroad grants has entailed a heavy burden of expense, and administrative diligence, upon the Interior Department and will continue to do so until such grants are finally adjusted.

While we owe our substantive mineral propositions to the mother country, that is, Great Britain, yet, as a matter of fact, the lands containing the greater part of the valuable minerals were obtained through concessions from France and Mexico; hence, we have, necessarily, a somewhat composite derivation of title—

\*Address delivered to Twenty-seventh Annual Convention, The American Mining Congress.  
†Commissioner, General Land Office.

English, French and Spanish. This, however, is not at all apparent in the framing of our statutory regulations for the disposition of minerals, which practically are the codified rules and customs then prevalent among our pioneer miners. The reason for this lies in the fact that so many years elapsed under our national government before we adopted any specific mining laws that the influence of ancient laws and customs, which might be supposed to have attached themselves to the lands, or rather, run with the lands, had in effect entirely disappeared.

So far as the English rule is concerned, the minerals were held the property of the owner of the land, the surface right carrying with it everything beneath and above. This was, however, only *prima facie*. Exceptions might exist: (1) If the land contained royal mines, that is, mines containing gold or silver; or (2) that it was subject to some particular custom that defeated the *prima facie* ownership, as in the case of the tin mines of Cornwall and Devon, and the lead mines of Derbyshire; or (3) that the ownership of the mines and minerals had become, through conveyance, separated and distinct from the ownership of the soil and surface.

Under the Roman civil law the ownership property of all lands was vested in the State. By decree of Emperor Gratian, A. D. 367, 385, the right of the Crown in mines of gold and silver was exclusive. This decree was later embodied in the Imperial Constitution which was recognized and adopted by subsequent Emperors, and thus became the expression of the measure of Roman imperial rights in mines.

In France, from the earliest time, the law placed all mines, whether in public or private lands, at the disposition of the nation, and made the operation of mines subject to its consent and supervision, and especially for royalties in the matter of mines containing the more valuable minerals.

The Spanish law, as reflected in the mining laws of Mexico, in effect made all mines the property of the Royal Crown. They were, however, granted to subjects of the kingdom in property and in possession in such manner that they might be sold or devised, as other property, subject, however, to the payment of a specified royalty by the grantees, and that the mines should be operated in connection with the provisions of the law, on failure of which at any time the grant might be forfeited.

But the Federal Congress in dealing with the public mineral lands of the United States, took a long step in advance of the countries from which these lands were derived, and declared that our mineral lands should be open to exploration and purchase, on the discovery

of mineral, without any reservation of rentals or royalties to the United States, and thus the law has remained as to precious minerals down to the present day.

As for the non-metalliferous minerals, for many years they were subject to appropriation under the general mining law, with certain exceptions, but the form in which such deposits are found, is not in many cases such as to make the fundamental principle of discovery a suitable basis for the acquisition of title; and this, together with a desire to better conserve the national stock of minerals of this character, which find their principal use in domestic consumption, led ultimately, and after years of consideration by Congress, to the adoption of the mineral leasing act of February 25, 1920.

As one of the immediate results of the leasing act the receipts of the Federal Government from bonuses, royalties, and rentals under the law providing for the leasing of mineral rights on the public domain aggregated \$13,631,840.72 for the fiscal year ending June 30, 1924; and from the passage of the act, \$34,109,743.50.

It is interesting to note the difficulties encountered by our law makers in finding appropriate measures for the disposition of some of our non-metalliferous minerals, and especially is this true in respect to coal. By the act of July 1, 1864, two years before the passage of our general mining laws, Congress provided for the disposition of coal lands at public sale after notice of not less than three months, at a minimum price of \$20 per acre, such lands when sold to be thereafter liable to private entry at the minimum price. This act was supplemented by the statute of March 3, 1865, which in effect provided for a preemptive right to persons actually engaged in bona fide coal mining, at a minimum price, to purchase the lands embraced within their improvements in quantity not to exceed 160 acres. Thus the law stood until by the act of March 3, 1873, provision was made for cash entries by individuals of not more than 160 acres, or 320 acres to an association, at a price of not less than \$10 per acre for such lands more than 15 miles from any completed railroad, and not less than \$20 per acre for such lands within 15 miles of such a road. This act also provided for a preemptive right of purchase by one who had opened and improved a coal mine somewhat in accordance with the act of 1865 heretofore mentioned.

Inasmuch as the act of 1873 fixed minimum prices in the language of "not less than \$10 per acre," or "not less than \$20 per acre," the Department held it obligatory to ascertain the actual value of the coal lands before they were placed upon the market or made subject to entry, and thereafter such lands were

duly appraised and prices commensurate with the actual coal values were required to be paid by purchasers or entrymen. But the leasing act of 1920 now includes coal among the minerals that can only be developed through the leasing system.

The Interior Department found no little difficulty in determining just what its course of action should be in handling mining claims for petroleum deposits. The earlier decisions permitted such entries but without any discussion as to whether petroleum should be considered as a mineral or not. Later, when the question was made specific, the Department held that petroleum did not fall within the contemplation of the mineral laws and that claims therefor could not be located as placer mines. This decision, however, led to the passage of the act of February 11, 1897, wherein Congress declared that petroleum deposits should be subject to appropriation under the placer mining law.

While from the earliest period in the history of our disposition of public lands saline deposits had been reserved for special disposition, no general statute for such purpose was enacted. So the Department varied in its action on applications for lands of this character, sometimes holding that they were not subject to entry under the general mining law, and in other cases that such provisions were applicable. But after the decision of the Supreme Court in the case of Morton against Nebraska, 21 Wallace 660, it was uniformly held that Congress did not intend to permit the sale of salines in territories thereafter to be organized into States, but that such deposits were to be in effect withheld for the benefit of future States; and so the matter rested until the act of January 31, 1901, which provided that all unoccupied public lands of the United States containing salt springs or deposits of salt and chiefly valuable therefor, should be subject to location and purchase under the placer mining law.

I have thus reviewed briefly the story of Congressional action in the disposition of the mineral lands and mineral deposits the property of the United States, from which it may be observed that Congress as early as 1785 adopted a policy of developing the mineral wealth of the country under laws specifically addressed to that end. It is true that in many cases the reservations of mineral were for those deposits or substances that were held to be of more or less a necessity for immediate use in domestic consumption. But there never was a time when Congress did not jealously regard the possibility of title to mineral lands being acquired under some law that did not in terms provide therefor.

Yet with such a persistent, and consistent policy observed from the outset, (Continued on page 570)

# THE UNITED VERDE COPPER COMPANY'S BONUS METHODS

*The United Verde Copper Company Has Applied The "Bonus" System With Particularly Satisfactory Results Both To Labor And Management—The System Has Attracted A Desirable Class Of Labor And Has Reduced Labor Turnover To A Minimum, The Benefits Accruing To The Company Being Both Of A Direct And Indirect Nature*

By W. V. DECAMP\*

WE are presenting the following general discussion of bonus methods, combined with a detailed interpretation of the application of bonus methods to this plant, in order that the results of our experience may benefit others and that the criticism that results from this paper may be of benefit to all. We have no desire to give the impression that our system is the best, nor even that it has as yet reached maximum efficiency.

Due to the variable conditions encountered, a degree of standardization such as is found in many factories will never be reached in mining. For this reason no mine will ever attain the goal of perfection in any plan attempting to pay for labor along strictly equitable lines. However, we feel that perfection can be sufficiently approximated to make some form of payment other than the ordinary daily wage plan that will be of great value to mine operators. Since many mines carry out this idea in general, but do so by different methods, it is evident that there is either a disagreement as to the most beneficial system or that local conditions, such as class of labor employed, methods of mining, and general welfare conditions, tend to govern the specific method used.

A "bonus," as applied by this company, is a premium paid to an employe for results obtained in excess of that normally obtained under existing base rates. Its purpose is the reduction of unit costs. A direct saving, measurable at any time, is effected by increased results. An indirect saving, immeasurable, except perhaps, over a long period of time, results from a reduced labor turnover, better satisfied employes, and, incidentally, better planning of work by the employer, since he is constantly being urged toward it by the employe. The fact that the system tends toward an equitable basis of payment attracts a desirable class of labor and repels the disgruntled type with radical tendencies.

The methods of payment in use for labor consist of:

1. Day's pay plan (a minimum frequently established by law)
2. Piece work plan
3. Premium or bonus plan
4. Differential plan
5. Profit sharing plan.

\*General Mine Superintendent, United Verde Copper Company.

*In presenting this paper, I wish to make acknowledgment to Mr. W. W. Lynch, Efficiency Engineer, Mr. H. A. Wright, Chief Bonus Engineer, and Mr. Harry Seamon, former chief of Bonus Department. Also to Mr. Robert E. Tally and Mr. H. DeWitt Smith, whose support enabled the establishing of a successful bonus system.*  
—The Author

The day's pay plan, as indicated in Table I, will always be in use for certain classes of work where quality is essential and for miscellaneous labor that is difficult to standardize. Under this system some standard is generally established by the operating foreman, depending to a large degree on his personality and ability. This plan would include most salaried employes, watchmen, clean-up men, and others whose work is too indefinite to be classified. The remaining employes, consisting of from 60 to 80 percent, may be paid under any of the other methods indicated.

TABLE I.—Cost of Drifting on Day Rate (\$4.50 Base Rate)

Footage Per Shift	Efficiency Percent	Cost Per Foot (Without Bonus)	Rating
1.07	66.6	\$4.21	Poor
1.2	75.0	3.75	Fair
1.4	87.5	3.22	Good
1.6	100.0	2.81	Standard
1.8	112.5	2.50	
2.0	125.0	2.25	
2.4	150.0	1.88	
3.2	200.0	1.41	

The piece work plan, Table II, of payment was adopted long ago in manufacturing plants. It is specifically a 100 percent payment scheme wherein a definite

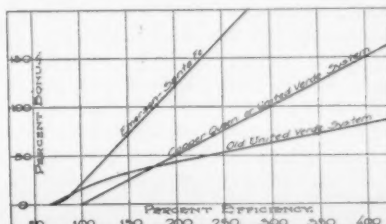


Figure 1

nite price is set for each part manufactured, and this price is paid regardless of the output. The method was at first enthusiastically accepted by employes, but soon fell into disrepute, principally due to cutting of rates. The reduction in rates was due to improper planning on the part of the management in establishing standards, and many years passed before confidence was again restored. The method may be compared to the present-day contract method employed by some mining companies, as indicated in Table II.

Under the premium or bonus there are several systems in use. The Premium Plan or Halsey System, Table III, named after its inventor, is one in which a definite time is set for the performance of a certain piece of work; this time is known as the standard time. If not accomplished in the time set, the employe is guaranteed his base rate; if accomplished in less than the standard time, then the employe is paid one-half of the saving time in addition to his base base rate, as indicated in Table III.

In the Emerson System, Table IV, there is a distinction between the term "standard" and "base" as applied to bonus rates. The "standard" is that rate of work that the average man can maintain, under ordinary conditions, by continuous effort, that is, by working at 100 percent efficiency. The "base" is that point of the percentage of the standard at which the payment of bonus begins. The system is applicable where standards can be accurately determined. The main advantage, however, is the principle of starting the bonus payment at two-thirds of the selected standard, thereby securing the cooperation of the subnormal workman.

The Santa Fe System, Table V, is one in which the efficiency of the average man is estimated to be approximately 66 percent. Assuming, then, the average output at 66 percent, the system is based on paying 1 percent increase in pay for each 2 percent increase in efficiency up to 100 percent. Beyond this point the employe receives practically the entire saving in the form of a bonus, as indicated in Table V.

From the above table it will be seen that the system is practically the same as the Emerson System.



The Taylor Bonus System, Table VI, is a differential piece-work system wherein the employe receives a certain rate when the standard is reached or bettered, and a lower rate per unit for work falling below the standard. The system is not applicable to mining in the State of Arizona, due to no guarantee of days' pay. Table VI indicates the method of payment.

The United Verde Bonus System, Table VII, if such it may be termed, is primarily a modification of the Halsey System, and is based on a payment of 1 percent of wage for each 1 percent increase in efficiency above the standard of 100 percent, as indicated in Table VII.

No payment is made until the standard is reached; beyond this point the employe and employer share equally in the reduction in costs. The system is moderately flexible, lacks the encouraging factors of those systems paying some bonus below the standard, is more flexible than the base rate or contract system, and is readily understood by the employe.

Profit sharing plans, when compared to other bonus payment methods, present the great disadvantage that the individual has little or no control over the portion of the profits he may receive. Ultimate profits of large organizations depend upon many variable factors that are beyond the individual's control, such as taxes, market conditions, supply of labor, etc. The employe therefore quickly loses sight of everything except the increment of profit in which he shares, and is forced to a realization that the payment he receives bears no relation to his individual effort.

There are two general methods in use in the mines of this country which attempt to carry out the principles outlined above. These are commonly known as the "contract system" and the "bonus system." In each case the details of carrying out the system vary considerably with different mines. Some companies have no particular organization to manage their contract or bonus system, as the case may be, but are content to allow it to function with very little attention. Others feel that proper functioning is dependent on careful supervision, and so have elaborate organizations for this purpose. Even among the companies employing the more elaborate systems there are scarcely two who operate along the same lines. Particularly is this true among companies using a "bonus system." On the other hand, there is a basic similarity between all of these methods and it is possible that the result of experimenting, for such it is, will be a more nearly standardized method employing the good points of all.

The "contract system," as applied in general to mining work, is closely allied

TABLE II—The Hundred Percent Bonus

Footage per shift	Efficiency, Pct.	Bonus earnings		Total cost per ft.	Reduct'n in cost per ft.	Percent saving paid as bonus
		Pct.	Per shift			
1.07	66.6	...	\$....	\$4.21	\$1.22	....
1.2	75.0	...	....	3.75	0.48	....
1.4	87.5	2.0	0.09	3.28	none	100.0
1.6	100.0	16.7	0.75	3.28	none	100.0
1.8	112.5	31.2	1.40	3.28	none	100.0
2.0	125.0	45.8	2.06	3.28	none	100.0
2.4	150.0	74.7	3.37	3.28	none	100.0
3.2	200.0	133.3	6.00	3.28	none	100.0

TABLE III—The Halsey System, or Fifty Percent Bonus

Footage per shift	Efficiency, Pct.	Bonus earnings		Total cost per ft.	Reduct'n in cost per ft.	Percent saving paid as bonus
		Pct.	Per shift			
1.07	66.6	...	\$....	\$4.21	\$1.40	....
1.2	75.0	....	....	3.75	0.94	....
1.4	87.5	....	....	3.20	0.41	....
1.6	100.0	....	....	2.81	....	....
1.8	112.5	6.2	0.28	2.67	0.15	50.0
2.0	125.0	12.5	0.56	2.53	0.28	50.0
2.4	150.0	25.0	1.12	2.34	0.47	50.0
3.2	200.0	50.0	2.25	2.11	0.70	50.0

TABLE IV—The Emerson Bonus

Footage per shift	Efficiency, Pct.	Bonus earnings		Total cost per ft.	Reduct'n in cost per ft.	Percent saving paid as bonus
		Pct.	Per shift			
1.07	66.6	...	\$....	\$4.21	\$1.22	....
1.2	75.0	0.9	0.04	3.77	0.49	....
1.4	87.5	6.2	0.28	3.42	0.14	....
1.6	100.0	16.7	0.75	3.28	none	100.0
1.8	112.5	29.0	1.31	3.24	0.04	95.0
2.0	125.0	41.0	1.85	3.18	0.10	90.0
2.4	150.0	65.0	2.93	3.11	0.17	88.0
3.2	200.0	114.0	5.13	3.01	0.27	86.0

with the "piece work" plan of payment found in many factories. Under this plan there is usually no calling for bids nor any written agreement between the operator and employe. It consists simply of a statement by the employer that a certain price per unit of performance will be given to the employe. For example, a company may agree to pay one or more miners \$5.00 per foot for driving a heading, the cost of explosives to be included in this figure. Likewise a shoveller may be paid on the basis of 30c per car of ore delivered at a certain place. In most states the employe is guaranteed by law the prevailing day wage regardless of his performance. For this reason the "contract system" as here applied differs from the ordinary conception of a contract, for here the contractor has nothing to lose by the agreement. Due to the ever existing competition between the various mining districts, as well as that between the component mines of any particular district, it is the policy to set contract prices high enough to assure satisfaction to the employe and low enough to assure low costs to the employer. This naturally forms the basis of contract standards, which, as will be explained later, differs from the basis of standards as applied to the "bonus system."

Under the "bonus system" a standard of performance is established for any particular operation as that which the operator expects from the employe for

the daily wage, which, as explained above, may be guaranteed by law. Any performance above this standard is considered a saving to the operator, and for it he gives a premium in the form of a certain percentage of the saving effected. Under this system, competition for labor enters as it does under the "contract system," and this fact governs the percentage of saving given the employe. It must be high enough to be worth while to the employe and low enough to insure a saving to the employer. The basic principles of bonus payment herein described apply to all bonus systems. The method of carrying out the system varies with the different operators.

There is a distinct similarity between contract and bonus systems in that both tend to pay men in accordance with their ability and effort. The advantages and disadvantages of such methods of payment as against the ordinary daily wage plan may be summed up as follows:

#### Advantages:

1. There is a direct reduction of unit costs.
2. Higher earnings are made by employes, resulting in less labor turnover.
3. Less supervision is required.
4. Better planning of work results.
5. A better class of labor is attracted.

#### Disadvantages:

1. There is a tendency to sacrifice safety precautions for speed.



TABLE V—The Santa Fe Bonus

Footage per shift	Efficiency, Pct.	Bonus earnings			Total cost per ft.	Reduct'n in cost per ft.	Percent saving paid as bonus
		Pct.	Per shift	Per foot			
1.07	66.6	...	\$....	\$....	\$4.21	\$1.04	...
1.2	75.0	3.2	0.15	0.13	3.86	0.61	36.0
1.4	87.5	11.5	0.52	0.38	3.67	0.40	58.0
1.6	100.0	20.0	0.90	0.56	3.37	none	100.0
1.8	112.5	32.0	1.44	0.80	3.30	0.07	95.0
2.0	125.0	45.0	2.03	1.02	3.25	0.12	90.0
2.4	150.0	75.0	3.38	1.40	3.16	0.21	88.0
3.2	200.0	120.0	5.40	1.68	3.09	0.28	86.0

TABLE VI—The Taylor Bonus

Footage per shift	Efficiency, Pct.	Bonus earnings			Total cost per ft.	Reduct'n in cost per ft.	Percent saving paid as bonus
		Pct.	Per shift	Per foot			
1.07	66.6	....	\$....	\$....	\$2.73	\$0.55	none
1.2	75.0	....	....	....	2.73	0.55	none
1.4	87.5	....	....	....	2.73	0.55	none
1.6	100.0	17.0	0.75	0.47	3.28	none	100.0
1.8	112.5	31.0	1.40	0.78	3.28	none	100.0
2.0	125.0	46.0	2.06	1.03	3.28	none	100.0
2.4	150.0	75.0	3.37	1.40	3.28	none	100.0
3.2	200.0	133.0	6.00	1.87	3.28	none	100.0

TABLE VII—The United Verde Bonus

Footage per shift	Efficiency, Pct.	Bonus earnings			Total cost per ft.	Reduct'n in cost per ft.	Percent saving paid as bonus
		Pct.	Per shift	Per foot			
1.07	66.6	...	\$....	\$....	\$4.21	\$1.40	...
1.2	75.0	...	....	....	3.75	0.94	...
1.4	87.5	...	....	....	3.20	0.41	...
1.6	100.0	...	....	....	2.81	....	...
1.8	112.5	6.2	0.28	0.15	2.65	0.15	50.0
2.0	125.0	12.5	0.56	0.28	2.53	0.28	50.0
2.4	150.0	25.0	1.12	0.47	2.34	0.47	50.0
3.2	200.0	50.0	2.25	0.70	2.11	0.70	50.0

2. There is a tendency in stoping to sacrifice clean mining for greater tonnage.
3. Carelessness in the use of supplies is encouraged.
4. Such methods are usually opposed by union labor.
5. Managements are unable to standardize the work of all employees, causing dissatisfaction among those working only on daily wage basis.

As to the comparative merits of bonus and contract systems, there has been in the past a considerable amount of discussion among the mine operators. Bonus systems have been condemned in general on one hand and contract systems on the other. We feel that, properly managed, each has its application and the adverse criticism directed against either is only against the method and accuracy of carrying out the principles themselves. Neither of the methods is self-operating, but, on the other hand, require constant careful attention on the part of the branch of an organization designed for that purpose. It is the lack of this attention, resulting in a lack of confidence among employees, that has in some cases caused serious trouble. Probably the greatest advantage of the contract system is its simplicity of form and the psychological effect produced by it. This is particularly true in development work. A miner knowing that he is receiving a certain amount per foot can readily determine his earnings at any time. He watches his earnings grow

with great interest, and feels a greater independence than when working under any other system. The average miner feels a certain prestige in having the term "contractor" applied to him. The exceptional man is able to earn high wages, higher than under most bonus systems, and it is toward encouraging this type of man that the contract system caters. Thus, granting proper management, in a mine in the development stage, where the number of men employed is comparatively few, probably a contract system would be better than any other.

However, the psychological effect mentioned above is apt to create a disadvantageous effect when all the work in a large mine is put on a contract basis. Whereas quality in development is something that is not apt to be impaired by speed, the same is not true in stoping. Here grade of ore, quality of timbering, safety precautions, use of materials, and so forth, are all factors for which supervision is very essential for successful operation. Due to the independence felt by men working on contract, interference by non-participating bosses is resented, with the result that there is a tendency toward inferior work or dissatisfaction among the workers. Though this should also theoretically apply to a bonus system, practice has shown that it does not do so to a serious extent. Thus it would seem that in stoping operations a bonus

system is more advantageous than a contract system. Perhaps an ideal situation would result in placing all development work on contract basis and all other work on a bonus basis.

The Fifty-Fifty Split Bonus implies an equal division of saving above the standard, and, since it is easily understood, it has a great appeal to the average employee. It is specifically a contract for all work above the standard at a rate of 50 percent as great as for work within the standard limits, as illustrated below.

With a rate of 1.5 feet per miner shift, and wages at \$5.00 per day, the employee, if he equals the standard, is doing work at a cost of \$3.33 1/3 per foot. If he performs twice this much, or 200 percent, and receives 50 percent of his wages in bonus, the cost for the portion above the standard is \$1.66 2/3 per foot, and in fact, if it were so decided, all work above the standard could be contracted for and your bonus system would still retain its essential features.

Under any system of work standards of some sort will be established by the foreman or individual in direct charge of operations. This standard will vary according to the disposition of the boss, and, since this is the case, then why not establish definite standards for all classes of work in all departments, based on actual conditions encountered? This permits more or less of a standard requirement for all departments and affords an opportunity for comparison of the work done by different bosses or different sections of the mine.

The Fifty-Fifty Split Bonus may be changed to any other split or to a 100 percent bonus or participating contract simply by changing standards. It is more fair than any system except a 100 percent participating contract; the method of calculating earnings is simple; it is very flexible; and, in general, its only disadvantage as compared to other systems is the non-payment of bonus until the standard is reached, or, in other words, it has no encouraging features for the employee until the standard is reached and it is therefore frequently impossible to interest those men whose performance is below average.

Under this system, or any other, continual vigilance is necessary in order that improvements in methods and planning of work will not increase a man's earnings beyond what he is entitled to because of his own efforts.

#### HISTORY OF BONUS AT THE UNITED VERDE MINE

Although bonus payments were made at the United Verde mine prior to 1921, the application was so unsystematic as to be unworthy of discussion here. Miners alone were allowed to benefit by it. How-

ever, the results were sufficient to show that with proper management the desired results could be obtained. Therefore, in 1921 a campaign was started for the gradual construction of a system whereby a maximum number of employees might be working on a bonus. It might well be said here that this company has not yet ended. This fact will indicate that the construction of a bonus system is a slow process, and we feel that this is necessary if the best results are to be obtained.

Realizing the difficulty of establishing correct standards for all classes of work, particularly since it was planned to extend the bonus system to the shops and steam shovel operations, it was decided to first establish a system whereby errors in standards would not result in great loss to the company. At the same time employees could increase their earnings while a study of the situation was being made. Moreover, the psychological effects of a bonus system could be studied.

The plan adopted at that time was modeled from a system in use in the shops of the Santa Fe Railroad. It was based on the assumption that the average man is 66  $\frac{2}{3}$  percent efficient. To reach the point of 100 percent efficiency, or "standard," it would, then, on this basis, be necessary for a man to do one and one-half times the work of the average. Above the point of 66 percent efficiency a 1 percent increase in wages was paid for each 2 percent increase in efficiency up to the point of 110 percent. Beyond this point the percentage of increase in wages gradually diminished with increased efficiency. As previously indicated, it was felt that efficiency ratings above 110 percent would be reached only through improper setting of standards, due either to ignorance or inability to foresee conditions, and the flattening of the curve was therefore considered justifiable. (See curves, Figure I.)

#### Method of Calculating Bonus Under United Verde System.

S—Standard { Feet or unit per shift  
or hours per unit.

P=Performance.

$\frac{P}{S}$ =E or Efficiency.

$\frac{1}{2}$  (E-100)=Bonus Paid.

Though the system described above served its purpose for future work, it was found to have many faults. In the first place, it was found that exceptionally good men were able to produce results as high as twice the amount of the average man. For this reason the flattening of the curve did such men a real injustice. This objection, of course, could have been overcome by eventually

carrying out the curve as a straight line. However, the system had other objectionable features. Due to the fact that the bonus payments began at a point below "standard," it was difficult, and in most cases impossible, for the worker to understand the method of figuring his bonus payment. In other words, the system lacked simplicity. It was found that those men who could calculate their earnings took a keener interest than the others and had confidence in the system. Others who could not understand it were apt to be suspicious of the system, a fact which caused them to hesitate in putting forth their best efforts.

In adopting the present system, there-

fore, the company decided to make it as comprehensible as possible and to do away with the flattening of the bonus curve described above. Moreover, whereas, under the previous system, the personnel of the bonus organization, consisting of a chief and an assistant, had been sufficient to keep in close touch with all bonus work, it was decided to increase the force sufficiently to insure close observation of all bonus operations. Previous experience had taught that, first, close personal contact with the workers is essential in order that grievances, whether real or imaginary, may be promptly settled, and second, standards should be verbally explained to men

Figure IV

1650 Level—10-0 No. 4 Stope

Conditions:  
Method of mining..... Cut-and-fill  
Class of ore..... Schist, iron, and silicious iron

#### Standards:

Mining .....	0.8 sets per man shift (very hard)
	1.2 sets per man shift (hard)
	1.5 sets per man shift (medium)
	1.8 sets per man shift (soft)
Mucking .....	14 cars per man shift
	11 cars per man shift
Timbering .....	40 cars per man shift
Filling .....	3 sets per man shift

#### Bonus Record:

Operation	Standard	Work Done	Time Allowed	Time Required	Rating Pct.	Bonus Pct.
Mining	0.8 sets	18 sets	22.5			
	1.2 sets	92 sets	76.7			
	1.5 sets	90 sets	60.0			
	1.8 sets	62.2 sets	62.2			
Mucking	14 cars	2,324 cars	221.4	108	205	52.5
	11 cars	6,972 cars	166.0			
			633.8			
Timbering	40 cars	8,506 cars	799.8	591	135	17.5
	3 sets	282 sets	212.6	114	186	43.0
Filling			94.0	77	122	11.0

Figure V

800 Level—18.0 Stope

Conditions:  
Method of mining..... Square Set  
Class of ore..... Silicious iron

#### Standards:

Mining .....	1.0 sets per man shift
	0.5 sets per man shift
Mucking .....	8.5 cars per man shift
	8.0 cars per man shift
Timbering .....	1.0 sets per man shift
	0.5 sets per man shift

#### Bonus Record:

Operation	Standard	Work Done	Time Allowed	Time Required	Rating Pct.	Bonus Pct.
Mining	1.0 sets	4 sets	4			
	0.5 sets	14 sets	28			
Mucking	8.5 cars	1,089 cars	32	24	133	16.5
	8.0 cars	740 cars	128.1			
			92.5			
Timbering	1.0 sets	34 sets	220.6	160	138	19.0
	0.5 sets	20 sets	34			
Misc. Timbering			40			
			75			
			149	113	132	16.0

who would otherwise not know, and third, that conditions warranting a change in standard should be recognized and the change be made immediately.

In the spring of 1923 a definite Fifty-Fifty Split Bonus was adopted, but no bonus was included or paid until the standard or 100 percent was reached. Standards were again carefully revised, based on the change in method and on the information gained during the preceding years of operation, with particular attention being given to improvements that would be made in equipment and methods. The new system and all its changes were discussed with many of the bonus employees, and interest was stimulated, and as soon as their first bonus checks were paid and they found that they had made as much or more for the same effort as in the past, a general spirit of confidence resulted. Whenever changes are made in a standard (and it becomes necessary to make occasional changes) the matter is discussed with the employees before said change is made, and in practically every instance these changes have been made without causing dissatisfaction.

The bonus organization at present consists of:

One chief bonus engineer in charge of bonus work for all departments, working directly with the mine superintendent.

Three bonus or rating engineers underground, who see each man on their beat at least twice a week, who keep records of all performance, and consult with their chief daily in regard to changes that may become necessary or allowances that must be made to cover unusual conditions.

One bonus engineer in the shops working under the same conditions as the underground engineers.

One bonus engineer in the steam shovel department.

One stenographer-clerk for filing and maintaining records of all bonus operations, typing notices, bulletins, etc.

Previous to the starting of a specific job, the bonus department is notified, records are consulted and a standard placed on the work. Immediately thereafter a sheet is posted on the bulletin board showing the place, work order, or number of the job, standard number of

hours or standard advance per day required, and then work is started. Figure II is from a photograph of one of these job sheets to which time is posted daily in order that the employee may see just how many shifts or hours are charged to this particular job.

A time card, as indicated by Figure III, is marked with day's pay or bonus by the timekeeper or shift boss and turned in by the employee.

Some bonus jobs last only a few hours,

to a large degree on the working place, but in general are as follows:

Stoping—Method of mining:

Silling, square set, cut-and-fill, gloryhole, level pillar;

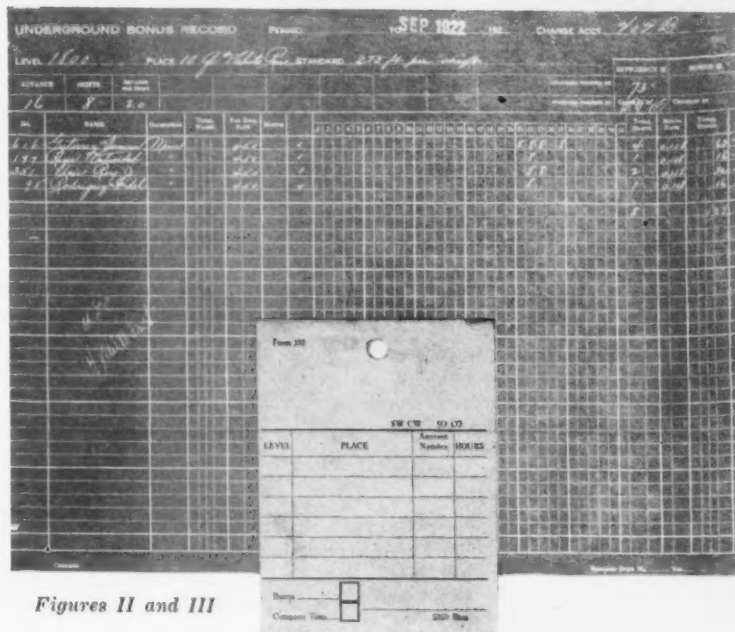
Drilling speed:

Soft, medium, hard, extra hard;

Spacing of chutes;

Temperature and general working conditions.

Great care is exercised in rating the



Figures II and III

others run for several days or even a month, and in any event a separate sheet is made for separate jobs, except for miscellaneous shop work, which is handled on a single sheet.

All bonus payments are made on the 21st of the month following the month in which bonus was earned. The employee, however, is notified of the efficiency he has attained either on completion of the job or shortly after the first of the month in case the job lasts the entire month.

#### UNDERGROUND BONUS

In adopting standards for underground work the factors to be included depend

on the job and not the man. In case a stope has two or even three different classes of ground, there will be a different rate for each classification. Also a stope may be worked by a combination of square set and cut-and-fill, in which case each mining method takes a separate rate. The standard on each class of ground is not changed unless the method of mining is changed. The following illustration (Figure IV) is a typical case taken at random for a stope mined by the cut-and-fill method in three different types of ground, showing name of man working, working place, rates for the different classes of ground, number of sets of each class broken, efficiency attained, and daily and total bonus earned. (Illustration 1650-level, No. 4 Stope, attached.) In addition Figure V for the 800-level, 18-0 stope, is a typical monthly report for a square set section, showing in addition to regular form, class of mining, character of ore, drilling speed, etc.

#### Developments:

In establishing standards for development work the factors considered are:

Figure VI

#### DEVELOPMENT—2250-level, 17-M Northwest Crosscut

Place .....	2250-level, 17-M NW Crosscut
Size .....	6½ feet by 7½ feet
Character .....	Porphyry, drilling 12" per minute
Timbered .....	No
Number of holes .....	22 to 27
Number of machines .....	Two
Distance to tram .....	700 feet

	Standard	Work Done	Time Allowed	Time Required	Rating Pet.	Bonus Pet.
Mining	1.3 ft.	121	93.1	51	183	41.5
Mucking	1.0 ft.	121	121.0	114	106	3.0



(As indicated by the following typical example)

Place .....	2250-level
Size .....	6½' x 7½'
Character .....	Porphyry, drilling speed ...." min.
Timbered .....	No
Number of holes.....	22 to 27
Number of machines.....	Two
Distance to tram.....	500 feet *

The attached reproduction of bonus sheet Figure VI for the 2250-level, 17-M northwest crosscut indicates a typical month's work in this heading.

#### Tramming:

The tramming sheet, Figure VII, from the 1650-level shows the factors on which bonus is based.

Figure VIII is a typical summary of underground bonus paid for the month of February, 1924. The costs obtained for this class of work under the bonus method as compared to costs for similar stopes during 1918 is best indicated by the fact that the standard in 1918 was 0.9 sets per shift and today is 1.8 sets.

#### Mechanical Bonus:

When it was finally decided in 1921 to apply the bonus system to shop operation, we were confronted with the necessity of obtaining sufficient information on various jobs to permit of establishing standards. The only information available as to the time required for various operations was that held by individual foremen and the master mechanic as a result of previous experience. It was therefore decided rather than to await the long period of time necessary to file information on the various operations to start occasional bonus jobs based on the information supplied by the foreman. The records obtained on these jobs were carefully filed, with particular attention to the basic factors.

It was realized in the beginning that many mechanical jobs, whether a construction job, repair job, or general overhauling work, consisted of a series of basic factors, that is, that all shop work could be reduced to the following fundamental operations:

Castings—Weight of material entering same; cost of constructing models or patterns; cost of moulds; cost of sanding, chipping, etc.

Lathe work: Number of cuts and depth of each required for a specific performance.

Planing: Same as for lathe work.

Boring or drilling: Size of hole, class of material, depth bored.

Cutting plate: Shearing per linear foot for various thicknesses, burning per linear foot for various thicknesses.

Riveting: Size of rivets, cold or hot driven, time required for driving specific number under either condition.

Welding: Time required for welding material of various sizes, acetylene or electric weld, or coal fire.

Handling: Delivery of material to and from various parts of plant.

Assembling: Detailed operations entering assembly of completed job.

It is obvious that any construction job includes a part or all of the above factors. If the unit time for each classification is understood for the type and size of material used, then when any construction job is started, it may be resolved into its component parts, the time estimated for each part, and a total time obtained, including transfer of material provided this item is included in the bonus payments.

#### REPAIR JOBS

Repair work probably presents the most difficult conditions for establishing standards, since previous to repairing a piece of equipment very little is known as to what may be found when the job

is finally torn down, on account of all the parts needing repair not being visible until disassembly is complete. It therefore became necessary to establish a time for disassembly, then to establish a standard for the repair of the various details going to make up the total operation.

By maintaining careful records of all performances in the shop, and referring to them, all jobs which become repeat orders can be quickly rated because of the filed information available, and at the end of a year's time it will be found that a large portion of the work consists of duplicate jobs which greatly simplify standardization.

Because difficulty was experienced in the shops in keeping bonus employees on bonus work, and in order to accomplish this, it became immediately necessary to adopt definite rules and policies for the routing of work through the various shops. This in itself greatly improved working conditions, the bonus employees assisting to a large degree, and when earnings became appreciable they frequently insisted on being kept on bonus work, and it was necessary to know the

FIGURE VII  
1650—Level Tramming  
Distance handled—900 feet  
(Storage battery locomotive)

Standard *70 cars per man shift	Work Done	Time Allowed	Time Required	Rating Pct.	Bonus Pct.
	26,013 cars	371.6	273	136	18.0

FIGURE VIII.  
United Verde Copper Company Bonus Report, Mine Department,  
February, 1924

	Total Shifts	Bonus Shifts	Ratio Shifts	Bonus Earned	
				Total	Average
Jigger Bosses.....	840	773	92.0	\$1,049.15	\$1.36
Cage Riders.....	112	27	24.1	13.35	0.49
Carmen .....	9,152	5,911	64.6	3,308.33	0.56
Chucks .....	423	.....	.....	.....	.....
Diamond Drillers .....	185	185	100.0	617.71	3.34
Ditchmen .....	217	.....	.....	.....	.....
Hoistmen (1st motion).....	172	36	20.9	97.76	2.72
Hoistmen (stp.-Shaft).....	231	.....	.....	.....	.....
Laborers, Roustabouts.....	324	.....	.....	.....	.....
Ore Bin Loaders.....	97	97	100.0	63.23	0.65
Miners .....	4,648	3,791	81.6	6,410.70	1.69
Shaft Miners.....	55	55	100.0	55.10	1.00
Pluggermen .....	1,453	1,453	100.0	829.05	0.57
Motormen .....	891	649	72.8	478.09	0.74
Switchmen .....	759	615	81.0	397.32	0.65
Hopewell Motormen.....	101	82	81.0	199.73	2.44
Hopewell Switchmen.....	102	83	81.0	182.30	2.20
Hopewell Carmen.....	95	77	81.0	158.11	2.05
Steel Nippers.....	118	118	100.0	124.20	1.05
Pipemen .....	262	262	100.0	185.86	0.71
Powdermen .....	275	2	0.7	0.61	0.31
Pumpmen .....	51	.....	.....	.....	.....
Skip Tenders.....	97	55	56.7	76.24	1.39
Timbermen .....	1,655	1,410	85.2	1,307.04	0.93
Timber Helpers.....	1,646	1,315	79.9	1,074.06	0.82
Track Helpers.....	578	437	75.6	176.50	0.40
Drill Repair Shop.....	160	160	100.0	218.08	1.36
Lime Quarry.....	242	242	100.0	525.96	2.17
Switch Board Operators.....	67	.....	.....	.....	.....
Watchmen .....	426	.....	.....	.....	.....
Bucking Room Men.....	100	.....	.....	.....	.....
Miscellaneous Janitors.....	88	.....	.....	.....	.....
Timber Framers.....	80	80	100.0	115.66	1.45
Lumber Yard.....	121	121	100.0	100.61	0.83
Salaried Employees.....	865	.....	.....	.....	.....
	26,688	18,036	67.6	\$17,764.65	\$0.98



FIGURE IX.—Total Cost for Steel Sharpener Shop, 1923

	Jigger boss	Sharpener	Helper	B.S. H.P.	Total shifts	Total steel	Total cost	Cost per steel	Bonus	Bonus Pct.
January .....	29	168	165	5	367	37,870	\$2,156.37	\$0.0567	\$410.86	23.5
February .....	23	142	150	10	325	36,000	1,976.96	0.0549	444.51	29.0
March .....	27	195	166	2	390	44,653	2,493.42	0.0558	625.58	33.5
April .....	28	200	204	2	435*	43,530	2,747.08	0.0631	487.44	21.5
May .....	28	202½	181	6	417½	48,060	2,786.28	0.0579	699.73	32.0
June .....	27	201	195	56	479	49,600	3,039.46	0.0611	588.22	24.0
July .....	26	231	175	53	485	50,940	3,137.69	0.0615	627.82	25.0
August .....	28	235	229	32½	505†	56,547	2,433.90	0.0607	730.19	27.0
September .....	25	227	244	9	524	54,192	3,259.54	0.0601	652.12	25.0
October .....	28	298	272	11	611	66,231	3,952.00	0.0596	875.65	27.5
November .....	28	296	343	13	680‡	64,127	3,731.29	0.0581	555.63	17.5
December .....	27¼	303¾	339¼	1	644	67,368	3,737.89	0.0555	644.04	24.5
Total for year.....					5,862	619,118	\$35,451.88	.....	\$7,341.59	...
Average for year....					488.5	51,593	\$2,954.36	\$0.0587	\$611.79	26.0

\* Wages raised. † Steel tempering machine installed. ‡ Wages lowered.

FIGURE X.—Make One Tank for Steam Shovel No. 121  
(Size, 120"x72"x30". Plate to be ¼". Rivets to be ½". Capacity, 990 gallons.)

	Estimated time
Lay out side plates (4) 1,148 holes spaced 1½" centers.....	4 man shifts
Lay out one top plate 180 holes, 4—2" radius bends.....	1 " "
Punch and shear one template.....	1 " "
Punch and shear plates.....	4 " "
Marking plates from template.....	3 " "
Bend side plates (4).....	5½ " "
Flanging top and bottom plates.....	9 " "
Assemble tank.....	8 " "
Drill holes and assemble tee iron for corners.....	3 " "
Riveting tank, 1,148 rivets, @ 250 per three-man shift.....	13½ " "
Lay out, punch and burn two-man holes.....	2 " "
Test and calk tank.....	6 " "
Actual time, 38½ man shifts; 152% efficiency.....	58 " "

FIGURE XI.—United Verde Copper Company Bonus Report, Mechanical Department, February, 1924

	Total shifts	Bonus shifts	Ratio shifts	Bonus earned Total	Bonus earned Ave.
Machine shop .....	823	584	70.9	\$534.57	\$0.92
Boiler shop .....	861	993	82.9	848.94	0.85
		(279 previous most)			
Car repair shop .....	61	35	57.3	26.18	0.75
Carpenter shop .....	154	48	31.2	57.66	1.20
Locomotive crane .....	45	.....	.....	.....	.....
Drill sharpeners .....	773	705	91.2	805.44	1.14
Blacksmith shop .....	192	192	100.0	173.49	0.90
Laborers, roustabouts .....	766	172	22.5	48.82	0.28
Paint shop .....	80	28	35.0	17.46	0.62
Pipe shop .....	174	107	61.5	120.92	1.13
Electric shop .....	465	381	81.9	327.42	0.86
Cement finishers .....	39	.....	.....	.....	.....
Cable repair men .....	25	24	96.0	21.12	0.88
Compressor engineers .....	97	.....	.....	.....	.....
Pipe line riders .....	55	.....	.....	.....	.....
Warehousemen .....	101	.....	.....	.....	.....
Teamsters .....	29	.....	.....	.....	.....
Truck drivers .....	16	.....	.....	.....	.....
Miscellaneous helpers .....	22	.....	.....	.....	.....
Salaried employes .....	207	.....	.....	.....	.....
	4,985	3,269	60.0	\$2,982.02	\$0.91
		279			
		2,990			

proper sequence of work in order that they could be so engaged.

In special cases, such as the sharpening of drill steel on sharpening machines, the only information necessary was the number of pieces of steel that could be sharpened in a given period of time by an operator and his helper and still withstand inspection. Since steel sharpening is a continuous operation, there is very

little variation entering into the work; the same men are on the same job daily, steel is delivered to them and taken away. Inspection of steel, therefore, to eliminate a tendency of overheating in order to obtain faster operation is the only point requiring attention. (See Figure IX.)

In boiler shop operation, the construc-

tion of a steel tank is indicative of jobs frequently encountered. (Figure X.)

The attached table of bonus earnings (Figure XI) in the Mechanical Department represents a typical month's operation.

#### STEAM SHOVEL BONUS

Steam shovel work consists essentially of four major operations as follows:

Drilling and breaking of ground preparatory to shovelling.

Shovel operations, or digging.

Tramming of material when loaded.

Pit and dump track maintenance.

All of the above operations are so closely related that a lack of efficiency in one influences the others.

Practically no information was available at the time the steam shovel bonus was adopted, since the work ahead of the department was radically different from the work previously accomplished. It could be foreseen that numerous changes would take place as the work progressed. Standards were adopted for churn drilling, drilling of toe holes by jackhammers, blockholing of boulders, digging by shovels of various sizes in various classes of material, delivery of the material to the dumps or transfer raises, with special attention to distance trammed and number of tramming crews. Figure XII indicates a typical month's operation of the No. 300 Marion revolving shovel. Drilling of toe holes by jackhammers and the results obtained are also indicated on Figure XIII.

Figure XIV indicates payments in the shovel department for February, 1924.

#### SMELTER BONUS

In applying the bonus to shop operation at the smelter, the same conditions were encountered as in the mine shops, and a similar method of attack was followed. With smelter operation, however, little or no information was available on which to base standards, and such information had to be acquired gradually as operation proceeded. By dividing the operation into its component parts, it became possible to adopt standards for

FIGURE XII.—Operation Steam Shovel  
No. 300

Standard.....	800 cu. yds. per shovel shift
Shift worked.....	24
Standard.....	19,200 cu. yds.
Actual.....	32,376 cu. yds.
Efficiency, %.....	169
Bonus, %.....	34.5

FIGURE XIII.—Steam Shovel—Breaking  
Ground—Powder Gang

Standard.....	125 cu. yds. per man shift
Shifts worked.....	635%
Standard.....	79,422 cu. yds.
Actual.....	91,790
Efficiency %.....	116
Bonus %.....	8

## Drilling With Jackhammers

Standards..	18 ft. per shift in diorite
	32 ft. per shift in quartz
	48 ft. per shift in schist
Standards..	2% shifts @ 18 ft... 50 ft.
	4% shifts @ 32 ft... 152 ft.
	6% shifts @ 48 ft... 318 ft.
	520
Actual.....	629 ft.
Efficiency %.....	121
Bonus %.....	10.5

the various elements going to make up the entire operation.

FUTURE POSSIBILITIES AND EXTENSION  
OF THE BONUS SYSTEM

As indicated in the history of the bonus system as applied at this property, there has been a tendency to increase the percentage of payments to the employe as more detailed information became available, and as the efficiency of the various operations increase. It is therefore possible that the ultimate transition of our present bonus system will be to a one hundred percent participating bonus or contract. Up to the present time foremen and bosses other than jigger bosses have not been included in the bonus, and probably will not be included unless it can be shown that they are directly responsible for specific reductions in cost, and therefore entitled to a percentage of these reductions. Rather than give bosses and foremen a bonus, which in a sense would be merely an increase in wages, it would be better to give them a definite increase in salary and thereby eliminate the possibility of collusion in the rate fixing, which might result if they were on bonus.

Raising of standards for various operations will continue as conditions improve, that is, when better equipment is supplied or when the method of doing work is installed over which the operator has no control. The adoption of various means of interesting men in the bonus work will continue, such as the reversion to task systems enumerated in dollars and cents figures for those lacking in intelligence whereby they may more fully understand the basis of pay-

ment. Other schemes, such as organization publications may be adopted to further interest men in their earnings and the earnings of others.

Little or no extension of our present bonus department will be necessary under present operating conditions. An increase in production, however, would mean an increase in this department. The present cost of the bonus department per month is as follows:

Head Efficiency Engineer	
Three Underground Bonus Engineers	\$1,250
Two Shop Bonus Engineers	per mo.
One Stenographer-clerk	

## CONCLUSIONS

In any case where a payment greater than the base rate is made, it should be for results obtained in excess of that normally obtained under the base rate. To determine the standard on which to establish bonus rates a careful study of past costs should be made. This analysis should cover a period of low wages, normal efficiency, and under normal operating conditions by average men. A comparison of costs at similar properties is also advisable.

Standards, methods of payment, and all bonus work should be under the direction of a special department. This department should consist of a chief, with a sufficient number of assistants to see each man frequently. These assistants should be men of bossing caliber, and their personality such as to inspire confidence.

Methods of calculating bonus earnings should be as simple as possible, and even

order that each man will know exactly what his standard is and why it exists, so, they must be explained verbally in even though he may have no knowledge of how the rate was established.

When employing some classes of foreign labor, it becomes very difficult to make them understand even the most simple methods of calculation. This may be overcome by reverting to task system, that is, once a bonus system is established, convert rates into dollars and cents. The employe may then be told, "If you clean out the muck from a 4-foot round, you earn one dollar; a 4'-foot round, a dollar and a half," etc., or, "If you tram ten cars, there will be no bonus; for eleven cars a certain amount, etc."

The above statement may appear contradictory, but it is frequently the case that a man will make no effort to improve his work. If told that he must clean out a round, and then finds that he receives a bonus, his confidence is gained and he becomes an enthusiastic bonus employe.

Development work lends itself to the application of bonus methods readily, as advance can very easily be noted, and the employe can see the results of his work daily. Square set work is also easy to place on bonus, as the man has a unit that is readily understood. In open stopes, however, it is difficult to obtain results, as unit volumes are used that must be measured at intervals. Where such standards can be based on something daily visible, such as depth or number of holes drilled, the system is readily understood.

FIGURE XIV.—United Verde Copper Company Bonus Report, Steam Shovel Department, February, 1924

	Total shifts	Bonus shifts	Ratio shifts	Bonus earned Total	Bonus earned Ave.
Locomotive engineers.....	343	208	60.6	\$252.81	\$1.22
Locomotive firemen.....	277	208	75.1	189.37	0.91
S. S. engineers.....	144	103	71.5	157.80	1.53
S. S. cranemen.....	155	104	67.1	117.76	1.13
S. S. firemen.....	157	102	65.0	87.39	0.86
S. S. oilers.....	50	35	70.0	28.45	0.81
Jackhammer men.....	801	801	100.0	430.01	0.54
Pitmen.....	425	337	79.3	219.00	0.65
Laborers.....	3,762	3,036	80.7	128.49	0.04
Keystone drillers.....	188	67	35.6	29.01	0.43
Locomotive crane.....	46	24	52.1	72.26	3.01
Boiler shop.....	92	92	100.0	124.44	1.35
Machine shop.....	493	436	88.4	327.47	0.75
Blacksmith shop.....	81	78	96.3	88.61	1.14
Car repair shop.....	61	29	47.5	32.89	1.13
Pipe fitters.....	103	13	12.6	17.87	1.37
Switchmen.....	373	210	56.3	204.57	0.97
Carpenter shop.....	96	.....	.....	.....	.....
Paint shop.....	25	.....	.....	.....	.....
Switch tenders.....	32	.....	.....	.....	.....
Watchmen.....	102	.....	.....	.....	.....
Truck drivers.....	33	.....	.....	.....	.....
Hostlers.....	83	.....	.....	.....	.....
Powder foremen, jiggers.....	146	146	100.0	105.83	0.72
Cement men.....	14	.....	.....	.....	.....
Salaried employes.....	333	.....	.....	.....	.....
	8,415	6,029	71.6	\$2,614.03	\$0.43

Standards should be determined as accurately as possible, and when once established should remain constant for the period adopted unless there is a change of condition reached that is easily seen by the men concerned. Careful study of average ground conditions will enable the fixing of standards for a period of thirty days. Day's pay should be allowed for unavoidable delays or an allowance made to cover same.

In no case should the man be rated. Conditions, ground, or the job should be the basis for a rate, and rates should change only when conditions change.

Payments should be made soon after the end of the period, and should be by separate check in order to keep bonus earnings distinct from base rates. If possible, men should be informed daily of their bonus earnings. This may be impractical in many cases, and, if so, then periods of notification should be either weekly or semi-monthly.

Standards should be posted immediately on starting a new piece of work. Posting of standards at the start of an operation is essential. Payment of bonus for past performance, where standards are established after the work is completed, presuppose absolute confidence on the part of the employee, and are not satisfactory any more than placing a contract rate after completion of same would be. The employee is no different in his reaction towards such methods than the salary or contract employee. We all want to know before starting work what pay we are to receive, and if we take a contract we want to know the price at the start. Likewise for the successful premium or bonus plan—we want to know what is required and exactly what we will receive if said requirements are exceeded.

Rating engineers, shift bosses, or foremen should not participate in the bonus, since supervision by disinterested parties is necessary in order that the quality of the work will not suffer, and to preclude the possibility of collusion in rate fixing. In case bosses are placed on bonus, their standards may be based on a percentage of the average earnings of the employees they supervise.

When the work of an individual can be rated and records of his performance maintained, it is easy to obtain results. As the size of the gang on a specific job increases there is a tendency toward the loss of individuality with the various members of the gang and the results are not so satisfactory.

Supervision of the bonus system, constant readjustment, and constant follow-up are essential for success. If one installs a bonus system with the idea that it will be automatic in operation when once started, he will surely be doomed to early failure.

The adjustment of claims becomes no

small part of the system, since it is frequent that errors in timekeeping or lack of understanding of conditions will result in an injustice to the employee. Such claims should be adjusted on a basis that is fair to both the employee and the employer, and once the average bonus employee becomes confident that he will receive a square deal from his employer, he will become an active, interested bonus employee.

Original records play an important part and must be accurately kept by the shift boss and bonus engineer to avoid dissatisfaction. The training of bosses in proper marking of cards must be diligently followed, as a boss may mark bonus against a working place that should not be so marked, and the result is a high labor charge against the place and a reduction of bonus for the men actually engaged.

When two-shift work is practiced, men of equal ability should be placed opposite each other. This is one of the most difficult things to handle, and at times a change to one-shift work can be made. This may be done by working a stope in two sections, or, in development, by placing two machines in a heading.

The effect of a good bonus system on the management will be quickly apparent. Good bonus men will demand good equipment, and will take good care of it. The study of costs, in order to permit of establishing standards, will teach the management many things they never knew, and will result generally in closer attention to the work, a more detailed study of conditions, higher efficiency, better planning and routing of work, decreased labor turn-over, and a high standard of performance.



Main Entrance to the White House, Washington, D. C.

## ANNUAL MEETING NEW MEXICO CHAPTER AMERICAN MINING CONGRESS.

AT the recent meeting of the New Mexico Chapter of the American Mining Congress, John M. Sully of the Chino Copper Company was elected Governor; E. M. Sawyer, 1st Vice-Governor; C. T. Brown, 2nd Vice-Governor; S. J. Kidder, 3rd Vice-Governor; Ira L. Wright, Treasurer; and J. F. Woodbury, Secretary.

The meeting was attended by a large and representative number of New Mexico's mining men and was a very enthusiastic and constructive one. Among the items included in the broadened policy, which the meeting adopted, was a decision to take a more active part in the advertising of the mineral resources of the State. Papers were presented by Dr. E. H. Wells, President of the New Mexico School of Mines, Socorro, N. M., on "The Mineral Resources of New Mexico"; Horace Moses, Superintendent of the Gallup-American Company of Gallup, on "Safety Precautions and Devices Used by the Gallup-American Coal Company." A special paper on "The Concentration of Copper Ores" was presented by H. B. Cramer.

The entire Board of Directors is as follows: John M. Sully, R. H. Dickinson, S. J. Kidder, Ira L. Wright, E. M. Sawyer, B. B. Hanger, F. W. Vellacott, I. J. Stauber, G. A. Kaseman, V. Carl Grubnau, L. M. Kniffen, E. H. Wells and Powell Stackhouse, Jr.

Employees of the Golden Rod Mining & Smelting Corporation of Tar River, Oklahoma, have been insured under the group plan for a total of \$160,000. The policy, issued by the Metropolitan Life Insurance Company, was written on the contributory basis whereby the Golden Rod Company and the workers jointly pay the premiums. Each employee is entitled to acquire \$1,000 life protection and in addition accident and health insurance which provides for \$10 a week benefits to any sick or injured worker, for a period of 26 weeks. Besides the actual provisions of the policy, certain service advantages are included in the insurance program. Among these are the distribution to employees of pamphlets on health and sanitation subjects.

At the October meeting of the New Mexico Chapter of the American Mining Congress a committee was appointed to prepare a bill to be presented to the next state legislature, authorizing the creation of a State Department of Mines and Minerals, and provide funds for its maintenance.



## A TARIFF ON MINERALS\*

*Mr. Morrison Urges The Taking Of The Question Of The Protective Tariff Out Of Politics, Tells How A Tariff Measure Is Arrived At, And Urges The Retention Of The Present Schedules If A Prosperous America Is Desired*

By A. CRESSY MORRISON†

OWING to the fact that the tariff is in politics, it is probable that no subject of political discussion has more praise and more vitriol thrown upon it. It seems that every four years we have got to go through this terrible discussion, which is sure to upset business, make capital doubtful and hold progress in check. A great many people don't come in contact with foreign competition directly, therefore they don't understand its relation, its meaning to the individual. Some of us are in the forefront of that competition, and we encounter it. We encounter it to our detriment and damage, and sometimes to our utter discouragement. The tariff is an old subject. Probably its name came seven or eight hundred years ago, when Abou Tarefa landed on an island near the Straits of Gibraltar and levied a tariff upon all passing vessels. It was piratical. It is interesting to know that the town of Antwerp got its name, curiously, from a tariff. Antwerp is situated under the river Skel, and legend has it that a giant threw a chain across the Skel, and said: "If you enter my country to trade you must give up 50 percent of your cargo to me, and then you can go through and trade." It is said that a youth encountered the giant, and by a magic sword cut off his head and then whirled the "hant" across the river, and as he did so the chain fell, and the town of "Hantwerp"—Antwerp—was named. The Hanseatic League, merchants—German in essence, or Germanic—lasted nearly 300 years, in the fourteenth, fifteenth and early sixteenth centuries. They were a league of merchants that built towns within towns.

I have been through some of the old warehouses of those merchants. Their policy was to keep their own people—and in Bergen, Norway, for instance, they had 3,000 merchants and clerks—all within a wall, or within a pale, that they never allowed to intermarry because they might become too friendly or too much attached to the country in which these merchants were doing business. The merchants loaned money to the great potentates and others in those countries and thereby secured control of the trade. The laws which were made governing the governments were often dictated by the Hanseatic League and not by the people of those countries.

Some of the policies and principals

which actuated that league are in operation today, and you will find importers and merchants in every country anxious to modify the laws of that country to permit the bringing in of these goods with as little competition as possible, and some of them are unscrupulous enough to believe that if they can destroy a home industry they will become a monopolist in the trade in that particular commodity. So that the Hanseatic League is dead, but the spirit which actuated it is still in operation.

There is a curious psychology in all peoples. That which comes from afar seems to have a different flavor—it is perhaps a little better. How many of you gentlemen have been to your tailor today, and he said: "Well, now, here is some very fine goods that was made in America; but here is something that you want—they are imported." And what is it, really, that the other fellow can do better than we can? Still, it existed in the early days of our colonies and exists today. Gradually the population grew, and finally our Government was formed. And with the institution of our Government came the institution of manufacturers, and one of the basic policies of our country at that time was a moderate tariff to protect the producers in the United States, and the producer at that time was still generally regarded as the manufacturer. So that a tradition exists that a tariff is a manufacturer's tariff. I wish that tradition could be destroyed and it could be said that the tariff is a people's tariff, because that is a fact. Slavery had a great deal to do with our tariff. One of the reasons that the southern people have so long resisted a tariff—a position which they are modifying at the present time—was because they thought they had the cheapest labor in the world in slavery; they felt that to produce vast crops and sell them abroad and purchase their requirements abroad was the simplest possible proposal, and it looked good to them. The result was that they did not encourage manufacture in the South, but it was all agriculture and commerce. The North, having a harder time existing, and getting a larger population, and not having slavery, found that if they could turn the finished product of the primary producer into the final product for the consumer that it would give employment to their people, keep the money in circu-

lation at home, the retail merchants would receive the compensation which the wage earner had earned, and it brought a general diversification which was better for all. The result was the North was for a tariff and the South was against a tariff, and between those two wavering influences it got into politics, and that is where we are today. As our empire spread and grew, it was discovered that we had the most wonderful country in the world. These pioneers who crossed the country and came here and took out the gold and the metals; those that went into the prairies and gave us our grain and gave us our wheat, gave us our cotton; those who dug into the phosphate rock to give us a fertilizer; those who exploited our forests, were dealing with God-given materials, turning it into the finished product and adding to the momentum and prosperity of the United States. The result of our utilization of those God-given materials has been to make us the most prosperous nation in the world and to give us a standard of living and a standard of wage that is above that of any other country. Perhaps if we had been less brave we wouldn't have developed the standard of living which gives comfort, clothing and food to all our people; but it has developed, and it's ours, and it comes from our own industry in utilizing God's beneficent gifts. And that today must be protected; that's the reason for a tariff.

Now, there is a great misapprehension regarding a tariff. I think it is fair to make a slight statement as to how a tariff is made, so that this fiction that the great industries go to Washington, and so, having largely contributed, now give our largess back again in the form of a tariff protection. I really think, and I speak with knowledge of the fact, that the poor corporation has about the hardest time getting anything out of Washington of any other class of people. If I was organized labor, if I was the Federation of Women's Clubs, I could go to Washington with some hope of success; but let any man go down there representing an industry, tackle the job and face the situation, and he will find he is opposed all the way along.

Here's how tariffs are made: A party is elected. If it is the Republican party it decides that the tariff should be revised. The assumption is certain to be that it will be revised upwards, if we have had a Democratic administration preceding it, because their assumption is

\*Address delivered to Twenty-seventh Annual Convention, The American Mining Congress.  
†Union Carbide Company.



that it must be revised downward. There is no reason for it; there is no analysis as to whether the thing is right, so as to know, but having been elected we must do one thing or the other; therefore we are in politics. A meeting is called by the Ways and Means Committee of the House, the committee having jurisdiction over all methods of raising revenue—and the tariff was passed as a system of raising revenue. They agree that they will hold hearings, and those hearings commence almost immediately. Everyone has a chance to appear before that committee who has anything to say on the subject of tariff, whether it is purely economic, whether it is political, or whether it deals specifically with some specific commodity. The hearings are open to the public. Every man who makes a question is subject to cross-examination by the Democratic members or the Republican members of that committee, so as to bring out the facts and to bring out all the points against him. He's also subjected to the attacks of those who are opposed to what he is proposing, be it a reduction or a rise. This committee divides itself into subcommittees giving special attention to particular subjects, such as textiles, agriculture, mining. During the last Congress the Subcommittee on Mining paid this American Mining Congress the highest possible compliment, because it invited its tariff expert to be its advisory member on metals and mining. The subcommittee reports to the main committee, and the main committee finally decides that the rates shall be as follows, or the verbage shall be as follows. There is another phase of the tariff that is little understood—the administrative provisions of the tariff; a code of laws which exists as a law but which is built up by court decisions. The Ways and Means Committee reports the bill. The bill is subject to debate on the floor, and, having passed the House, goes to the Senate, and you go through the same thing again.

I want to point out to you that it is extremely hard—in nearly two years of hearings and controversy and debate, in which every subject and every item—some six thousand items in the tariff bill—is discussed in detail, all of which is of record—for any serious injustice being done, either to an importer or to a manufacturer. The cases seem to be well heard. Now, having got the bill out of the House and through the Senate, it is reported to the Senate, when it is subject to weeks upon weeks of debate. Where the two Houses agree there is no further discussion, but they always disagree in hundreds and hundreds of items. That goes to a conference committee and is finally compromised and settled, and the conference report, as reported to both Houses, passed by both Houses, and

we have got a tariff law. My reason for going into detail regarding the construction of the tariff law is to remove the idea that special privilege has special advantages.

Now let me point out why a tariff. Last year I traveled all over Europe. If I had gone 10 years before I would have seen similar conditions, but not as bad for us. I found that Europe was



A. Cressy Morrison

not in the distress that we are led to believe it is by the internationalists. I didn't find starvation. I will speak particularly of Germany, because I think ultimately Germany is going to be one of our most serious competitors. I think there is a great misapprehension as to what happened in Germany when the mark began the slide. Here's what happened: If you own a printing press and set up a good print shop in this room, you can print a good many mark notes, especially if they come down to mere printed pieces of paper, and it is just as easy to print a hundred thousand marks, or one mark, and a million marks; it is all the same! it is only a question of adding a cipher—the press will run just as fast. All the way along the line of travel I found railroad tracks were being put in condition; found new depots were going up; everything was in fine shape. The trains traveled on time and in comparative luxury. The train of cars were not only filled but overcrowded, and there was food for them. The German Government didn't care a rap about the 23 cents it collected from me, because it could print a million-mark note for a quarter of a cent, and that was worth a dollar that day. What they were doing was this: They keep their railroad rates low, and keep the people contented. They printed these mark notes as rapidly as

labor and men in commerce and business men would take them. They bought materials and paid labor to work for these printed notes, and were building up an industrial condition and an industrial machine for competition later. So much so, indeed, that that mechanism of distribution, including new canals and everything, was so thoroughly developed by printed notes emanating from a printing press, and what it cost the German Government is practically nil, because they never take a note back. The whole thing is repudiated. If you were a workman, and a million-mark note was worth \$10, you would be very glad to take the million-mark note for your week's work, because you could spend it for \$9.90. Perhaps the next week it would go down to 900,000 marks. The reduction was slight. You were getting high wages, you were all engaged, everybody paid, and the note passing on and on.

Now here we are, with the Dawes plan straightening out Europe, with our country and other countries being asked to stabilize European currency by helping finance the European industries, and it is not going to be long before we are going to be subjected to the most extraordinary competition that we have ever encountered. Wages over there are less than pre-war wages here. No American workman can ever reduce his method of livelihood to the same standard that it is abroad. If we attempted to do that by the removal of tariffs and throw our men out of employment, or by the reduction of wages, we wouldn't need any country. There is plenty of discontent here in this country today; we are all getting fidgety and nervous and jumpy, and yet we are in that state of mind only in comparison with the rest of the world; we are in a state of amazing prosperity. Our working man today goes to work with his automobile, and he goes on wooden shoes in the other country. If we attempt any policy which will reduce labor standard and labor comforts, the education of children, the development of paved streets, the beautification of our cities and all those things which are the heritage of us all, to the standard abroad, we are not going to have any United States of America. So that the tariff is intimately connected with the actual political structure under which we live. The American people should come to a level-headed understanding that whatever we can make in our country, reasonably and economically, out of our resources, should be made. Why should we send anything abroad at 30 cents a pound today and buy back finished products at a dollar and a half a pound? That's what we have been doing. Why should we send our commodities over there in the state of the producers' finished material and have them come back with a lot of for-

eign labor added to them, and our own people sitting around waiting for a job? We have got to go to work and do those things in our own country which we can do successfully. There is a great misapprehension regarding this tariff. I think that most people feel that the tariff covers almost all commodities. In the tariff bills in effect during the last 20 years an average of more than 60 percent of the commodities in them have been and are on the free list. Of the remaining 40 percent, about 28 percent was on what is known as specific duty, so much a pound, so much a unit, and the rest are on ad valorem duties. The tariff is levied on those things in which there is a large element of labor; that's where our revenue comes from, earnings and wages and all sorts of things, where the raw material is small and the labor large, because we can't get over our tariff. In New England today they are working about one-third time in the textile mills, and the reason is because about 2,000,000 square yards of cloth come into our country from England, over our tariff, and throw those workmen out of a job. Even the workmen there are beginning to realize that.

The tariff on manganese, magnesite, tungsten, molybdenum and quicksilver is actually keeping these western mines in operation. The tariff is direct and immediate in its effect.

In speaking of the tariff, let us be a little bit respectful to our ancestors. They put a very good Constitution into the United States, and one of the things is a clause that permits the levying of tariffs on imports. The policy has been fairly consistent, and it's gone on now for 135 years.

The tariff creates in the United States business and manufacturing competition which ultimately holds the price within reason. We are at the mercy of American manufacturers, perhaps, but not at the mercy of foreigners. We have some laws against monopoly, but we can't control the foreign cartels and syndicates, and they always hold us up as soon as they can as long as they can destroy our industry. So the tariff has proved beneficent. It has been a direct benefit to the mining industry. You can't benefit one man without benefiting others. It is the basis of the prosperity of our country. It is primarily a protection to our liberty, and, beyond that, it is a protection to our standard of living, without which we can't have a country. If we wish to help Europe, let us keep America prosperous. A prosperous America can help Europe; a prostrate America cannot.

A study of the determination of magnetite in slags is to be undertaken at the Southwest Experiment Station of the Bureau of Mines, Tucson, Ariz.

## ZINC SMELTING AND REFINING

ACCORDING to data collected at the biennial census of manufactures, 1923, the establishments engaged in the smelting and refining of zinc reported products valued at \$94,183,900, an increase of 151.3 percent as compared with 1921, the latest preceding census year.

Of the 35 establishments reporting for 1923, 9 were located in Oklahoma, 8 in Illinois, 3 each in Arkansas, Kansas, Pennsylvania and West Virginia, and the remaining 6 in Colorado, Indiana, Tennessee and Texas.

## ACCIDENTS AT METALLURGICAL PLANTS

ACCIDENTS occurring at metallurgical plants in the United States in 1923 resulted in the death of 58 men and the injury of 8,476 others, according to statistics by the Bureau of Mines. The figures constitute a fatality rate of 0.96 and an injury rate of 141 per 1,000 full-time (300 day) workers. For 1922 the corresponding rates were 0.98 and 145, respectively.

Ore dressing plants and smelters in 1923 indicated a continuance of the upward trend, begun in 1922, from the low record of 1921, in volume of work done by the industry. At ore dressing plants the number of man-shifts of work reported was 92 percent above 1921, 40 percent above 1922 and only 8 percent below 1920, the most recent "normal" year. The reports for smelting plants showed an increase of 88 percent in the number of shifts worked as compared with 1921, and an increase of 28 percent as compared with 1922; the number was within 12 percent of the number of shifts worked in 1920. The average working time at ore dressing plants was 300 days per man; at smelters, 357 days; the former figure has not been exceeded since the war-year 1918, when the average operating time was 310 days per man; the latter figure for smelting plants is the highest on record. The nearest approach to the record for smelters in 1923 was that for 1913, when 355 workdays per man was recorded.

The reports showed a total of 54,418 men employed during 1923 at ore dressing plants, smelters and auxiliary works; the men performed 18,047,774 days of labor, an average of 332 days per man. The number of shifts worked was 4,245,456 in excess of the number reported for 1922.

The accident rates in the metallurgical industries for 1923 may be segregated as follows: For mills, the rates per 1,000 full-time workers were 1.55 killed and 168 injured; for smelters, 0.64 killed and 131 injured; for auxiliary work, 0.94 killed and 132 injured.

Of the 8,534 accidents during the year, 0.68 percent were fatal, 0.01 percent resulted in permanent total disability, 1.91 percent resulted in permanent partial disability, 26.42 percent caused temporary disability for more than 14 days and 70.98 percent caused temporary disability for more than the remainder of the shift but not exceeding 14 days.

"Metallurgy of Copper," by Hofman and Hayward. McGraw-Hill Book Co., N. Y. Price \$5.—The second edition of this book, originally prepared by the late Dr. Hofman, has been prepared and brought up to date by Professor Hayward, who was associated with him for twenty years. The book portrays the copper industry historically, statistically, physically, chemically, commercially and metallurgically. The cost data and descriptions of furnace and smelter practice are probably the best collation of this material extant.

The book is copiously illustrated and well indexed, and offers a convenient guide to the copper industry. Not only does it describe standard practice in the United States but tabulates essays, furnace charges, coal and coke mixtures, products and chemical reactions, and at the foot of each page is a complete bibliography. The book is a substantial contribution to current metallurgy.

More than 4,000,000 pounds of copper are annually consumed in the photoengraving and electrotyping industries.

At the present rate of consumption, between 2,500,000 and 3,000,000 pounds of copper are used each year in the manufacture of photo-engravings while more than 1,300,000 pounds go into the making of electrotypes. (*Copper and Brass Research Association.*)

The American Manganese Steel Company, Chicago Heights, Illinois, has announced the appointment of Mr. T. B. H. Askin as salesmanager for the Inter-mountain Division, with headquarters at Denver.

Announcement has been made that William J. Loring has become associated as an officer of the Princeton Gold Mines Company, and will at once assume the general direction of its field mining activities. The offices of the company are Hobart Building, San Francisco.

The value of gold and silver shipped from Alaska during the fiscal year ended June 30, 1924, amounted to \$6,183,241, or a decrease of \$1,313,336, making a net total decrease in shipments of all products of \$476,372.

## ELIMINATION OF WASTE THROUGH STANDARDIZATION\*

*Mr. Lakenan Believes That There Can Be No Substantial Progress In The Securing And Adopting Of National Mining Standards Until Manufacturers Of Mining Equipment Appreciate The Necessity For Coordination And Elimination Of Diversity Of Equipment—Consolidation And Interchange Of Service Is The Only Solution To The Production Problem*

By C. B. LAKENAN†

**F**ROM the inception of this most important crusade for relieving the worker of unnecessary labor for any given accomplishment, the officers of this Congress have been alert to the necessity of keeping up the interest of its members. Though much has already been accomplished they probably will admit it has not been an easy task, as many calls for papers on this or kindred subjects no doubt receive acknowledgment of inability to serve. One member may be too well and on his vacation, while another is too ill and bed-ridden. A reason for this gesture



C. B. Lakenan

must first be sought, after which there should be some more definite progress, for in my judgment the accomplishment to date is but a generalization dealing principally with the advantages of standardization of equipment. These advantages are well known to all of us and represent such savings of human effort as to be of substantial benefit in improving the living conditions of the average family.

Instances of waste in American industry due to multiplicity of design are so common as to need no discussion. Inspection of the junk piles of most large operating plants will be convincing of this, and a close inspection of any average hardware or general supply store will only emphasize the first impression. On the other hand, note the accomplishment of some up-to-date industrial plants. Probably few know that the list price of a Ford roadster on present-day quantity production is less than 20 cents per pound, or the same as the average locomotive or machine tool, in all of which industries every effort is being made to minimize waste and give full play to inventive genius and novel features worth while. It is only because of the high development that standardi-

zation has reached in these well-known outstanding examples that they can be sold to the ultimate consumer at one-half the price of other machines which have not reached that high degree of standardization. I think the common human tendency in all tasks of this or any other nature is to lean toward diagnosing the ills and never making an exploratory incision. The work of the Congress to date appears to me as having fully covered the diagnosis. We now need the operating table, the ether and the incision. Three patients have been diagnosed—the engineer, the operator and the manufacturer. Surely one of these is the guilty one, for if all three were united in standardization and each was backed by the interests each represented I would not be offering my humble effort here today. I believe that you will all agree that most engineers can be eliminated from taking the ether, and also that all will agree that the operator and manufacturer must disrobe and have their inner thoughts exposed. In my judgment, the operator can be brought back to normal with but a slight excision, but I fear the manufacturer will show up a complex which will worry the surgeon. To speak more plainly, the error of the operator in the purchase of equipment is one largely due to inexperience or incapacity, and is in a sense forgivable because the average operator is largely influenced by good salesmanship. Can the same be said of the average manufacturer, whose motive generally is profit regardless of the junk pile increase? Is not the fundamental principle of most manufacturers to "give them what they want," on the assumption that profit is the yardstick of success?

In emphasizing the nature of this complex no reasonable man would take the stand that all members of this group were culpable, nor that managers in productive industry were not of a high ethical and intellectual standard and thrilled with interest in improving methods and quality of the company's product. Notwithstanding this favoring of a good product the management of industry is limited in its choice to that which is to the best interest of the company stockholders. Operating men deal-

ing with labor-saving devices and with costs come almost daily in contact with useless duplications or modified designs which mean nothing in the art but additional grief to the repair gangs and warehousemen who must supply the necessary parts. This criticism is not against invention or novel design, but just the ordinary routine of fittings that go to make up the major losses in everyday life.

To cite just one instance which makes clear the limitation of manufacturers to come to the rescue. Late in 1923 interests with which I am connected determined to revamp certain heavy equipment. There were but two American companies manufacturing these parts. Both offered designs which were equally good, but different, and with prices approximately the same per pound in each bid. There was nothing strikingly inventive or novel in the design. The draughting departments of both companies were equally capable of executing this work. Why did these manufacturers not attempt a joint design? They knew the advantage of standardization better than the operator or engineer in that it would greatly reduce overhead expense and be of material benefit in cost reduction. But the manufacturer is not inclined to join with his competitor in any cooperative effort which has to do with sharing patents and technical talent except under mutually satisfactory arrangements which do not now exist. It would appear that standardization if carried to a really successful outcome must, in part, contemplate merging of interests, thereby giving equipment companies a free hand to use the most favorable assets of each and the best aggregation of technical talent of all. Such a pooling of interests need by no means throttle novelty of invention, which is important. On the other hand, this arrangement would, in my judgment, go a long way toward saving that billion dollars which it is claimed is wasted annually and must be paid for by the ultimate consumer. Just the means of accomplishment is the problem. There is a way and the path is straight if we are really interested in efficiency. It is indistinct if we prefer riotous freedom of design. We cannot have both efficiency and multiplicity of design except at heavy cost.

(Continued on page 572)

\*Address delivered to Twenty-seventh Annual Convention, The American Mining Congress.  
†General Manager, Nevada Consolidated Copper Company.



## HISTORY OF THE YUBA RIVER DISTRICT, CALIFORNIA\*

*The History Of The Yuba District, Full Of Romance, Beauty, And The Pioneer Spirit, Is Here Told In A Manner That Is A Real Contribution To Mining Literature*

By FRANK H. PROBERT†

CALIFORNIA, a land of plenty, rich in its varied produce mineralogically and agriculturally, presents within its boundaries a strikingly contrasted terrain of coast lands, great fertile valleys, undulating foothills and snow-crested Sierra. Each topographic division has been the stage of drama and tragedy in the short history of the state.

Of the aborigines, whose peaceful and valid possession of the land was so rudely disturbed by the advent of more progressive races, we know but little; the record is incomplete, the data from which the scrappy story has been compiled may be the imaginings of uncertain mind. The American Indian, born and bred of the soil, possessor of the land, pioneer of a great race destined to rule the world, became subservient to the adventurous or religious emissaries of alien powers.

The Cushnas, Yubas, Memals and Honcots, loosely knit bands of Indians without distinct tribal characteristics, lived a nomadic life in the central fertile valleys and warm coastal plains. They were primitive in their habits and instincts, polygamists according to their ability to support wives; they engaged in simple pursuits of hunting for food, not fighting for conquest. Living in crude dwellings, clad with little more than bear-skin overalls, supplemented at times with the hide of a deer or apron of tules, speaking diverse Cushna dialects, they congregated on the banks of river or stream, in forest or field, highland or lowland as nature directed them in the satisfaction of their physical needs. Dark skinned, thick-lipped, low-browed people, small of stature and light of limb, such were the citizens of California in the days when the lure of adventure and the lust of possession led the first adventurers to Alta California. The mysterious beginning of this land of gold, of grain and metal, flower and sunset, enhances its romantic history and for four centuries it has beckoned and called, attracted the wanderer, cured the roving spirit and compelled citizenship.

The fantastic story of the wanderings of Friar Marcos de Niza in search for the Cities of Cibola urged by the alluring tales of de Vaca ends, as it began, in dreams dreamed but never realized. The shores of the bay of San Diego first felt the portentous tread of the white man's aggressive step. Cabrillo, an agent of Cortez, landed in 1542, and the log of

his adventurous voyage piloted Vizcaino 60 years later to the natural harbors of the California coast, but in the meantime Sir Francis Drake, immortal in the annals of English naval history, took refuge in a protecting bay north of the Golden Gate in 1579. He took possession in the name of Queen Elizabeth, calling the country New Albion.

Two hundred years must pass before we weld the next link in the chain of our picturesque story, the Indians meanwhile living on and off the land in peaceful possession, save for the short-lived visit of diverse itinerant aliens. The land was found rich in game of all kinds, trappers and fur traders came from the north and south, and their commercial encroachments caused Spain to seek control. The colonizing influence of the Catholic faith, backed or prompted by an imperial policy of Spanish dominance, brought the Franciscan friars, successors to the disbanded Jesuits, to Alta, Calif. Fray Junipero Serra and his military associates, acting under advice of Don Jose Galvez, came and conquered, initiating and maintaining the Spanish era from 1769 until 1822, when Iturbide, through his envoy Augustin Fernandez de San Vicente, claimed the land as part of the new Mexican empire. During the Spanish régime roads were built, small farming communities sprang up extending along the valleys of the main waterways to the Sierra. The Sacramento River drains an area from the Sierra on the east between the Feather and Merced Rivers. The streams of the Yuba, Bear, American, Cosumnes, Mokelumne, Stanislaus and Tuolumne all discharge into the San Joaquin and Sacramento. The Yuba River Valley was among the first to be settled, a section now embracing the greater part of Yuba, Sierra and Nevada Counties. The word "Yuba" is probably a corruption of uvas (wild grapes), which grew in abundance on the banks of the Rio de las Uvas. The North Fork, Middle Fork and South Fork, all mighty streams in themselves, were peopled with groups of Central California Indians. J. J. Warner, a member of the Ewing Young party who traversed the Sacramento Valley on a trapping expedition in 1832, was impressed by the large Indian settlements, but the plague of cholera in 1833 depopulated the country in spite of the existence of a temascal or "sweat house" in every village.

The Spaniards traversed the inland valleys in the first decade of the nineteenth century. Gabriel Moraga, in 1808, left the Mission San Jose in search for other suitable sites at which to found pueblos in the Great Valley. He traversed the San Joaquin, the Calaveras, moved northward to the Mokelumne, Consumne, and American Rivers, reaching Auburn, destined to play so important a part in California history a few years later.

Again he moved westward to the Feather River, to Marysville Buttes, a conspicuous topographic outpost, along the Jesús Maria (Upper Sacramento) to Butte City, returning via Oroville. So this pious commandant of the Presidio of San Francisco, seeking expansion of Spanish influence, passed over the great gold field of California, oblivious of its presence, ignorant of its promise.

The secession of Mexico from the Spanish yoke ushered in a quarter century of charm and idleness, during which time trappers and travellers came from the north and east. Jedediah S. Smith, the first American to make the overland journey, left Salt Lake in August, 1826. He followed the Colorado River to Needles, crossed the Mojave Desert only to be ordered back to American soil by the commandant of San Diego. His presence and that of other immigrants to Mexican California via Sierra and sea was viewed with alarm. Jedediah Smith blazed some of the trails which later became the highways for the hordes of men who rushed to California in the days of '49.

Peter Skene Ogden in 1826 came from the north along the eastern slopes of the Cascades to the Pitt River—the Lassen route—while Alex McLeod in 1828 established the Applegate Cutoff. LaFramboise, a Hudson Bay trapper, in 1832 laid out the Oregon road from the Rogue River to the Sacramento. The California fever possessed the pioneers, the glories of land were widely advertised (nor has the custom changed in a hundred years), and men of all descriptions came to settle here in the neighborhood of what is now the county seat of Yuba. Three trans-Sierra passes were mapped and the heroic deeds of many are immortalized in prose and verse by Bret Harte and other writers. General Fremont's presence in California, while ostensibly to survey the mountain backbone of the Pacific States, presaged the struggle which the Mexican Government so much feared. The war clouds were

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*Gold Dredge Typical of Those Operating in the Yuba River District, California*

gathering as the dawn of the golden era approached.

A German Swiss, John A. Sutter, after graduating from the Berne Military Academy, came to America in 1834 and settled at St. Louis. News of the West caused him to seek the Land of Heart's Desire. He came to Vancouver, journeyed to the Sandwich Islands, returned to Sitka, Alaska, and was finally stranded on the coast of California near San Francisco in July, 1839. He soon became enamored with this land of sunshine, and in order that he might acquire property he heeded the request of Governor Alvarado and became a Mexican citizen, promising in return for gifts received to protect the Mexicans against marauding Indians. He was deeded a section of 11 square leagues bordering the Sacramento, American and Feather Rivers. The validity of this grant was later sustained by the United States Government. Sutter had hopes of founding an independent state in America. He established a trading post at New Helvetia (Sacramento), and although an officer in the Mexican Army he catered to the increasing number of emigrants. He was a shrewd colonizer; he leased lands to settlers and furnished supplies; he established many industries. He leased a parcel of land in 1842 to one Theodore Cordua in the Yuba Valley near the junction of the Feather River, who developed a prosperous farm and cattle ranch. The settlement was first called Cordua's Rancho, later it was styled New Mecklenburg; in 1849 it was renamed Yubaville, and is now known as Marysville in tribute to Mrs. Mary Covilland, one of the Donner party. Cordua himself obtained a grant of 7 square leagues bordering Sutter's to the north, and built up river traffic in his produce between New Helvetia and Yerba Buena (Sacramento and San Francisco), later extending it to Hawaii.

The Cordua Rancho was sold on January 1, 1849, to Michael C. Nye, a pioneer of the Sierra trails.

Sutter's thriving business suffered serious setback as war between Mexico and America for the possession of California approached. The Bear Flag Republic, or the Republic of California, was founded and abolished all within 26 days in 1846. On January 13, 1847, a peace was agreed upon in Alta, Calif., and on February 2, 1848, the Treaty of Guadalupe Hidalgo put an end to the Mexican War and California became the thirty-first state in the Union of the United States. Nine days prior to the signing of the treaty gold was discovered in California—but this is ahead of the story. A quotation from McGroarty's fascinating story of California emphasizes the ill fortune of the Spaniard:

"It is a strange fact to contemplate that the Spanish race, which was pre-eminently a race of gold-seekers, was in full and undisputed possession of California for a period of four-score years without making the discovery that it was the richest gold-bearing region that has ever been known on the face of the earth. In other words, the same people that had penetrated to the farthest recesses of South America in search of gold, which they took away with them to Spain by the shipload, and the same people that had wrung from the Incas of Peru and the Montezumas of Mexico untold treasures, possessed the hills and the valleys of a far richer country for more than three-quarters of a century without ever knowing that there lay shining at the bottom of the streams and locked in the bosom of the mountains of California a wealth of gold that was to make the wealth of the Aztecs appear paltry and insignificant. Even as the Bay of San Francisco was destined to be discovered by a landsman and not by a mariner, as would seem natural, so

was it destined that gold in California was to be discovered not by a Spaniard nor the son of a Spaniard who, with his people before him, had long occupied California, but by an American who was neither a prospector nor a miner, but an every-day working millwright."

In August, 1847, Sutter attempted to revive his dwindling fortunes, anticipating business expansion with the declaration of peace. He secured the services of a New Jersey carpenter, James W. Marshall, to build and operate a saw-mill. Marshall chose Butte Creek as the site of the mill, but Sutter's foreman advocated Coloma, on the South Fork of the American River in El Dorado County. Here during the winter of 1847 the mill was built, but trial tests pointed to necessary changes. The wheel was improperly placed and the tail race not sufficiently deep. The water was dammed back and then released to deepen the sluice. On the morning of January 24, 1848, gold was discovered. The nature of the find was questioned by the small group of workmen, and all of the simple culinary chemistry of Mrs. Wimmer's kitchen was needed to prove the physical and chemical constants of the shining yellow metal. Nor did the news of the discovery quickly eke out. Two months later, on March 15, the story reached San Francisco and a short notice appeared in the Californian, one of the two newspapers of that time. The California Star on March 25 announced that gold dust was an article of traffic at Sutter's Fort, and the editor, E. C. Kemble, visited the district in April, but, seeing little to interest him, he retracted his former editorial and branded the story as a fake. In May the exodus to the El Dorado began.

It was not until September 20 that the news reached the Atlantic States, and the headlines in the Baltimore Sun caused little comment until private re-

ports verified the newspaper announcement. The rush started in January, 1849. In June of that year the news had penetrated to Europe, the Orient and to Australia, and anything and everything that could possibly sail the seas disgorged its human cargo in San Francisco en route to Sutter's Mill. Prospecting parties scoured the streams of all the great drainage basin of the Sacramento.

On June 2, 1848, gold was found in the Yuba River by Jonas Spect, who was seeking to organize a party for the perilous journey across the Sierra, and while tarrying at Johnson's Ranch prospected the Bear River. He was unsuccessful and turned to the Yuba near Long Bar, where a few colors were found. He camped at Timbuctoo Ravine, prospected awhile, but, being discouraged, abandoned his claims in November and continued his journey eastwards.

Michael C. Nye and party about this time found gold at Rose Bar, on the Yuba. As the news of these new discoveries spread mushroom camps sprang up all along the river beds near the shallower bars.

On May 16, 1848, Claude Chana found gold in the Dry Diggings of Auburn Ravine, and in a few months many workers were able to make a daily clean-up of from \$1,000 to \$1,500. One embryo Croesus extracted \$16,000 gold from five carloads of dirt.

Bidwell's Bar, 3 miles from Oroville, was located in the midsummer of 1848, and so it seems that the prospectors spread like ants in every direction, Jasons on side trips in the land of Colchis, and the virgin gold fields of this Yuba River district which had escaped recognition for a century was laid bare within a few months.

Hangtown (now Placerville), Jacksonville, Poverty Flat, Columbia Bar were thriving communities; Marysville, Nevada City and Downieville became headquarters for the Main Yuba and Dry Creek, for Deer Creek, the South and Middle Forks of the Yuba, and for the North Yuba districts, respectively, while Sacramento was the distributing center and San Francisco the metropolis.

During the first five years following the rush about \$1,000,000,000 worth of gold was extracted from the stream beds of the Yuba River district, a contribution from California to the whole world far-reaching in its economic and human influence. The mind is thrilled as the exploits of the Argonauts are narrated. Were there ever such times, were there ever such men? Think of "the hounds," of the Vigilantes! Think of the days when "the amount you can raise at a pinch" (the quantity of gold dust that could be taken between thumb and finger) was the measure of a man's fitness for office! These were the days

of '49 when the commonplace phrases of today, such as "to strike it rich," "how will it pan out?" "to dig," originated and had a definite meaning. And with it all big hearts beat under dirty shirts; property rights were respected; men were moulded of fine fibre. A pioneer who later became Governor of Illinois wrote: "There was very little law, but a large amount of order; no churches, but a great deal of religion; no politics, but many politicians. Crime was rare, for punishment was certain. Justice was administered without attorney fees or court charges, with little loss of time and less expense."

Only the most crude methods were practised for the winning of the precious metal, but expediency called forth initiative and the rocker, Long Tom, and sluice were developed. Ground sluicing began in 1851 at the Coyoteville Diggings, now Nevada City, which place first adopted drift mining for "buried" placers in 1856. Here, too, in 1853 Matteson first applied the principles of hydraulicking to alluvial gravels. In October, 1849, Nevada City was founded by Dr. Caldwell, the place being known as Caldwell's Upper Store. The store served the diggers of Deer Creek. Increasing industry justified increasing dignity and the community became known as Coyote Diggings, Coyoteville and subsequently Nevada City. So, too, with Grass Valley, 4 miles to the southwest of Nevada City, on Wolf Creek, the early emigrants to the diggings halted on Badger Hill. At Gold Hill, near-by, in October, 1850, the possibilities of mining gold quartz veins was first recognized and milling practices were developed. Here, too, the first lode claim laws were written.

The excitement began in 1851, and while the section suffered many adversities in the first decade of its life, it later became the most prosperous mining town of California.

After two seasons of placering, attention was given to the croppings of resistant ledges of quartz in which gold was found "in place." From 1850 to 1860 the growth of the new industry was slow but certain, and it survives today. The "Mother Lode" is still the mainstay of California's gold production after 73 years' almost continuous operation.

Attention has been called to the high moral code that governed the attitude and relationships of men in the early days of the gold rush. The metal from placers was easily separated, little or no equipment was called for, and the returns, if any, were immediately available. Lode mining, however, was a more serious, more risky, more hazardous and therefore more adventurous business. Being more risky, it required more pro-

tection, and men gathered together to write crude but forceful codes to govern their actions and protect their properties. These gentlemanly understandings became the law of the land. In every district rules were framed for the government of the miners, regulating the shape and size of claims, possessory rights were secured and enforced, and conflicting opinions adjudicated. Claims 100 feet along the ledge were first prescribed, then 200 feet, without specification as to width. In the early sixties the width was determined, varying from 50 to a maximum of 600 feet. The El Dorado Mining District in 1863 established a maximum width of 600 feet, which was later written into the federal statutes of 1872, still operative.

After the California boom came the great Comstock in 1865. An exodus from California followed, and similar mining codes were adopted by the neighboring state of Nevada. The influence of these early rules, perhaps more rigidly respected than any act of legislature or federal edict, was felt throughout the growing West, in Arizona, Utah, Montana and later incorporated into the Mineral Lands Act of 1872, another instance of the part played by the Yuba River district in national affairs.

Hydraulic mining continued in the foothills of the Sierra for many years, increasing steadily from 1860 until 1876, when it reached a maximum output of about \$13,000,000 of gold. The magnitude of operations was the downfall of the industry, for the debris from the diggings became a menace to public property. The wave of protest found sympathetic audience in the United States Circuit Court, and on January 23, 1884, the Sawyer decision sounded a death knell, causing the demise of many companies whose plants and properties were valued at upward to \$100,000,000. An attempt to set aside this injunction resulted in the passage of the Caminetti Act in 1893, creating the California Debris Commission, charged with the duty of preventing further pollution of navigable streams and restoring them to their original condition. The act does not prohibit gravel mining; it enjoins any person from dumping debris into navigable streams or tributaries thereof within the drainage basin of the Sacramento and San Joaquin Rivers. It may be that public interest will demand support to remedial measures whereby structures will be built to give catchment basins for all detritus from natural as well as industrial causes, and that the profits from known resources so long deferred will be realized.

In concluding this review of historic progress, this story of grit and gold, of men and mining, mention should be made

(Continued on page 558)

## NATIONAL CONFERENCE ON UTILIZATION OF FOREST PRODUCTS

*The Startling Fact That Industry Is Consuming The National Timber Supply At A Rate That Means Exhaustion Within Forty Years Has Led To A Nation-wide Effort To Prevent Such A Calamity—The Mining Industry Is A Large Consumer Of Timbers And Has Pledged Assistance In The Plan*

THE National Conference on Utilization of Forest Products, held in Washington, November 19-20, inaugurated an important movement in conservation. The urgency of action in preserving our present timber supply until such time as production of this supply by proper methods of reforestation can bring this annual supply up to our annual consumption was forcibly put before the conference and acted as a great stimulus in formulating a national program not only for conserving our present timber supply but for reforestation.

The conference was held under the auspices of the U. S. Department of Agriculture and under the immediate direction of Colonel William B. Greeley, chief of the U. S. Forest Service. Colonel Greeley and his assistants prepared a program commensurate with the importance of the subject. Invitations to the conference were extended to representatives of all industries, organizations and research institutions which are interested in conservation. A large and most representative attendance indicates widespread interest.

Acting Secretary of Agriculture Howard M. Gore opened the first session of the conference stating briefly the objects of the conference and then introduced the President of the United States, who presented in a brief and most forceful manner not only the importance of the subject matter before the conference but with facts and figures absolutely insisted for immediate action in preserving our present timber supply and in increasing that supply by every means possible.

Mr. Coolidge gave the following graphic figures on production and consumption:

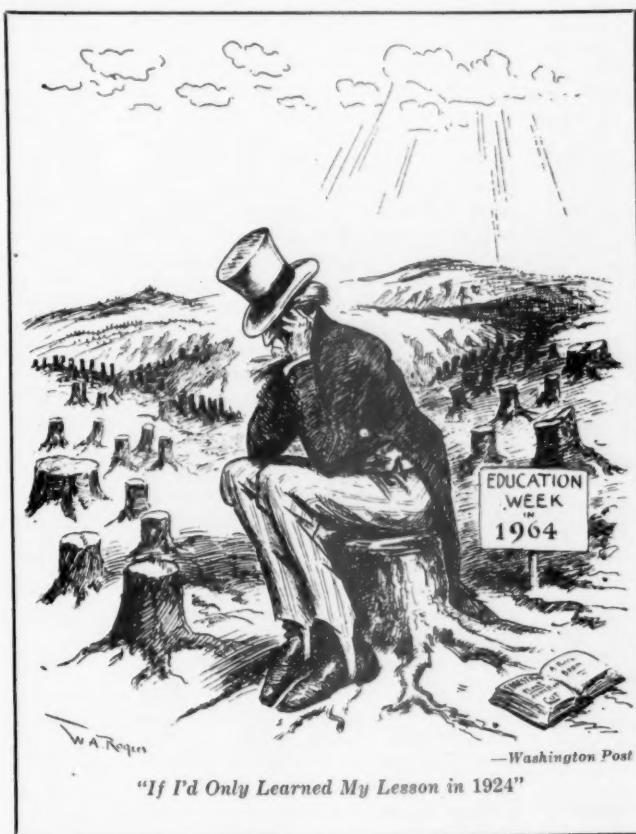
"Expressed roughly, we have left about 745 billion cubic feet of timber. From this the annual drain is 25 billion cubic feet. This total drain is most significant when we reflect that, toward

offsetting it, we have an annual timber growth of only 6 million cubic feet; and even in our young forests, where this growth is taking place, cutting has already outstripped growth. We must face the situation that at this rate we are not far from timber exhaustion."

Colonel Greeley and others then pre-

ference for adoption recommended the following lines of activity:

1. Arrange for the completion and general adoption and application of Lumber Standards as recommended by the Central Committee on Lumber Standards.
  2. Encourage a wider use of dimension stock by standardizing sizes of the lowest practical minimum.
  3. Develop the application of scientific principles to the problems of piling, storing, and drying lumber, in all its forms.
  4. Encourage the maximum service of wood by preservative treatments, in all situations where decay is a factor in its service.
  5. Extend the further use of approved methods for preventing the decay of pulp and pulpwood in storage.
  6. Give consideration to scientific methods for the arrest and prevention of decay in logs and lumber.
  7. Encourage surveys with the object of utilizing waste products through diversified operations.
  8. Develop, improve, and unify building codes; improved designs of boxes and crates; and other economies that may suggest themselves to the Committee.
  9. Make effective the improvements and economies that have been developed in the use of forest products by getting together the organized industrial units which consume these products and encouraging their members to take full advantage of improved practices.
- As an illustration of this suggestion, the mining industry has already de-



sented more in detail the object of the conference and suggested methods by which it could best accomplish its purpose. Following this presentation, a temporary Committee on Permanent Organization and Program was appointed with representatives from all industries represented at the conference. This committee immediately met and after a further discussion of the subject appointed sub-committees to prepare a program of action on the various subdivisions of the work before the conference. The report of these sub-committees as finally approved by the general committee and presented to the con-



veloped improved practices for economizing in the use of forest products, and would welcome the cooperation of the permanent organization.

10. In all public construction—Municipal, State, and National—in-sist upon the use of the improved practices which are herein recommended.
11. Collect all information that has already been developed by various organized units related to the use of wood and formulate a permanent plan for its distribution and application.

#### ACTIVITIES IN THE RESEARCH FIELD

Close utilization of timber and prevention of losses depend upon reliable knowledge obtained through investigation and experiment. A large amount of information has already been obtained through governmental and other research agencies. What has already been accomplished has demonstrated the great practical value of such information to the industries and in the conservation of our timber supplies. In spite of the progress that has been made we still need investigations of a far-reaching character to secure the information needed to bring about the most economical use of our forest products. With the progressive depletion of the old supplies of timber and the necessary economic and industrial readjustment, the results of well-directed research will be increasingly required.

The lines of investigation which, in the opinion of the committee, require first consideration are the following: wood losses; saw mill waste; little-used species; properties of wood.

A thoroughgoing timber survey will show the relation of the forest-using industries to their supply of raw material; it is essential as a basis for a comprehensive national forest policy.

More definite information should be available upon the following:

- a. The timber supply. How much timber of different species is available in saw timber and cordwood sizes, and where is it located?
- b. The amount of land available by regions and classes of soil upon which forests can be grown now and in the future.
- c. The rate at which timber is now growing and the potential growing capacity of the land.

This report was, after a very full discussion by the conference, unanimously adopted and the work of carrying out this important program is now in the hands of the Central Committee on Utilization of Forest Products which committee is composed of representa-

tives of all the national organizations interested in the conservation of our timber supply and increasing of that supply to meet our national requirements. This report would not be completed even in its complete form without calling attention to the fact that this great movement was inaugurated by our late Secretary of Agriculture Henry C. Wallace. A resolution was passed by the conference deploring the great loss to this movement in the death of Secretary Wallace.

The U. S. Forest Service is to be congratulated upon the able manner in which the program was carried out. The Forest Products Laboratory, a part of the U. S. Forest Service, has rendered conspicuous service in this field and special appreciation of this service was repeatedly heard at the conference.

Colonel Warren R. Roberts, president of Roberts & Schaefer Co., Chicago, and chairman National Standardization Division, The American Mining Congress, is the able representative of that organization on the permanent committee.

#### YUBA RIVER DISTRICT

(Continued from page 556)

of the indomitable spirit, the initiative and resourcefulness of those who seek their substance from the subsoil. The Sawyer decision was a body blow to a growing industry; it halted hydraulicking, but it did not stop the production of gold. Other methods were adopted and again California took the lead in exploiting gravel deposits, this time by dredging. Early in 1849 a mechanical contrivance was designed to scoop up gravel from inaccessible beds and bars. It was shipped from New York to San Francisco around the Horn, assembled and soon found a resting place at the bottom of the Sacramento River. Many similar efforts met with failure, but in 1898 dredging began. It became an established industry in 1901 and has contributed a substantial part (about 50 percent) to the state output since that time. In the tributary valleys of the Sacramento River, at Oroville, the "city of gold," Folsom and Yuba, the most modern dredging practices may be studied.

Memories of the golden age of the Yuba River district still linger in the minds of men grown grey. The pioneers have passed, and of them it may be said "they gave their strength to riskful search in the hard places of the earth. With warm hearts toward fellow men and hands ready to kindly deed, they filched from no man's store, lessened no man's opportunity, but took their wealth from the hills." This small central portion of California has contributed nearly two billions to the world's wealth since 1848.

#### THE IRON INDUSTRY IN 1923

IN magnitude of operations and of production the iron and steel industry recorded in 1923 its most remarkable peace-time year, according to the Geological Survey.

The increase in the production and shipment of iron ore in 1923 as compared with 1922 amounted respectively to 47 percent and 38 percent. The production of iron ore in 1923 was the fourth largest yet recorded, about equal to that in 1918. Every producing State except California, Missouri, and Montana made an increase in 1923. The average value per ton of iron ore at the mines in 1923 was \$3.45, which is 33 cents more than in 1922. The stocks of iron ore at the mines at the end of 1923 were 10,165,875 gross tons, a decrease of 3 percent from those of 1922.

Iron ore mined in the United States in 1923 (exclusive of ore containing 5 percent or more of manganese), gross tons:

Alabama .....	6,783,146
California .....	2,779
Colorado .....	4,102
Georgia .....	117,321
Idaho .....	1,290
Michigan .....	14,174,468
Minnesota .....	44,348,296
Missouri .....	53,546
Montana .....	17,751
Nevada .....	9,578
New Jersey .....	307,733
New Mexico .....	205,218
New York .....	541,922
North Carolina .....	59,684
Pennsylvania .....	993,441
Tennessee .....	267,275
Utah .....	57,752
Virginia .....	155,977
Wisconsin .....	871,416
Wyoming .....	378,747
Total .....	69,351,442

The quantity of pig iron made in 1923 was the largest yet recorded for a single year, 38,361,379 tons valued at \$946,799,388. Gains in shipments of pig iron were made by every producing State except Missouri. The increase was greatest in Massachusetts, Minnesota, Tennessee, and Virginia. The general average value of pig iron of all grades at the furnaces in 1923 was \$24.68 a ton, an increase of \$2.70 over the value in 1922.

Shipments of ferroalloys in 1923 amounted to 579,817 tons, valued at \$49,877,231, an increase of 37 percent. The shipments of ferromanganese showed a gain of 40 percent and those of spiegeleisen a gain of 91 percent.

Total receipts of the Patent Office amounted to \$3,042,276 for the past fiscal year, the largest ever received for any single year, according to the annual report submitted to the Secretary of the Interior.

## NATIONAL LEGISLATION

*The Short Session Of Congress Will Be Devoted To The Passage Of Appropriation Measures—It Is Expected That The Program Will Be Along Sane, Conservative Lines And That Economy Will Be The Goal*

**S**OBBERED by the overwhelming decision registered by the country at the polls in the recent election, Congress returned to its labors on Monday, December 1, ready to reshape its legislative program along sane, conservative lines. With a number of its radical members left at home through the emphatic declaration of the people that they are tired of the orgy of socialistic doctrines, conservatism is expected to reign supreme in the legislative halls. The few radicals who escaped defeat by the skin of their teeth are expected to curb their extreme progressive tendencies and cooperate with the majority in legislating along constitutional and practical lines. If the election is properly interpreted, it means an abatement of the agitation for government ownership of railroads, coal, minerals and water power. Apparently the death knell is tolling over numerous measures of this character which are pending from the last session.

As the Constitution limits this session to three months, the greater part of the time is expected to be devoted to administrative policies of the Government as expressed in the appropriation of funds for the support of the Government during the year beginning July 1 next. In addition to providing money for running the Government, the appropriation bills define future policy and are often productive of sharp debate, as the lines are closely drawn between continuing a present policy and marking out a new course of government bureau administration. Economy in government expenditure is the goal of both the President and Congress, and the appropriation bills will be given the closest consideration.

Some hold-over legislation of general interest awaits consideration, but its outcome at this time is problematical. Foremost in the group of legislative proposals is a resolution directing the Interstate Commerce Commission to readjust freight rates. This legislation was completed by the House at the last session, which ended in

June, and is on the Senate calendar subject to action. Advocates of legislation amending the transportation law will press for consideration of the Howell-Barkley bill, substituting boards of mediation for the Railroad Labor Board.

### SILVER PURCHASE

In the field of mining legislation the most important proposal contemplates the purchase by the Treasury Department, through the Mint Bureau, of 14,000,000 ounces of silver at \$1 per ounce. It is embodied in the Pittman bill and is based on the declaration that the Treasury failed to purchase this amount of silver to replace Pittman act silver used for subsidiary coinage. The bill has passed the Senate and is before the House Banking and Currency Committee, which is expected to shortly report the measure to the House and seek its enactment. The measure is of vital importance to the silver mining industry, as such purchases would be at \$1 per ounce, which would have the effect of maintaining this price in the silver market until the stipulated purchase was completed. Another silver proposal is for the extension of the life of the Senate Gold and Silver Commission dur-

ing the new Congress, which will begin March 5, 1925, in order to enable the Commission to complete its investigations.

Swan songs will be sung by a large group of Senators and Representatives during this closing session, as it will mark the end of their legislative career, at least for the time being. Legislative associations are as close as personal friendships and fond good-byes are said by Congressmen when they depart from the legislative halls. Among the Senatorial group to leave will be:

L. H. Ball, Delaware.  
Medill McCormick, Illinois.  
A. O. Stanley, Kentucky.  
David I. Walsh, Massachusetts.  
Magnus Johnson, Minnesota.  
H. O. Bursum, New Mexico.  
R. L. Owen, Oklahoma.  
N. B. Dial, South Carolina.  
Thomas Sterling, South Dakota.  
John K. Shields, Tennessee.  
Davis Elkins, West Virginia.  
The House group who will say their farewells include:  
Sydney Anderson, Minnesota.  
Frank Clark, Florida.  
Fred Dallinger, Massachusetts.  
Charles Davis, Minnesota.

Frederick H. Gillett, Massachusetts.  
Harry Hull, Iowa.  
John C. McKenzie, Illinois.  
Merrill Moores, Indiana.  
Mrs. Mae E. Nolan, California.  
Stuart F. Reed, West Virginia.  
Thomas H. Schall, Minnesota.  
Everett Sanders, Indiana.  
Homer P. Snyder, New York.  
Samuel P. Winslow, Massachusetts.

Some of these House members will transfer their headquarters to the Senate, to which they were elected in November. These include Mr. Gillett, who retires from the Speakership of the House on March 4, to become Senator from Massachusetts, and Mr. Schall, who will succeed Senator Johnson, of Minnesota, in the Upper House. A number of new Senators took their seats on De-



ember 1, having been elected to succeed to the unexpiring terms of other Senators whose places had been filled by temporary appointments. These include, in addition to Mr. Schall, the following:

Rice W. Means, of Colorado, succeeding A. B. Adams.

W. M. Butler, of Massachusetts, succeeding the late Senator Henry Cabot Lodge.

Jesse H. Metcalf, of Rhode Island, succeeding the late Senator L. B. Colt.

New Senators who will take their seats in March are:

T. C. DuPont, Delaware.

C. S. Deneen, Illinois.

F. M. Sackett, Kentucky.

S. G. Bratton, New Mexico.

W. B. Pine, Oklahoma.

C. L. Blease, South Carolina.

W. H. McMaster, South Dakota.

L. D. Tyson, Tennessee.

Guy D. Goff, West Virginia.

A successor is yet to be selected in Connecticut to the late Senator F. B. Brandegee, the candidates being Representatives John Q. Tilson and Schuyler Merritt.

#### MINING MEN

A number of mining men appear among the new men elected to Congress. Senator DuPont, of Delaware, who was formerly in the Senate from July, 1921, to November, 1922, has been extensively engaged in coal and iron mining in Kentucky, as has also been Senator Sackett, of Kentucky. Senator Pine, of Oklahoma, has been a prominent oil operator. Among the House members is Representative S. S. Arentz, of Nevada, the author of a bill revising the mining laws during his previous service in the House.

A merry race is already under way for the Speakership of the House, which will be vacated on March 4, when Speaker Gillett goes over to the Senate. The first to twirl his hat in the ring was Representative Martin B. Madden, of Illinois, who is chairman of the important Committee on Appropriations and a legislator of many years' service. Mr. Madden is a picturesque figure and an able debater. He has a worthy opponent for the Speakership in Representative Nicholas Longworth, the debonair House leader and son-in-law of the late President Roosevelt.

After March 4 Gen. Chas. G. Dawes will lend a little color to the prosaic proceedings of the Senate as its presiding officer. Senator Cummings of Iowa will retire as temporary presiding officer and resume his active committee work, which was curtailed in the last session by the Progressives who forced the election of a Democrat as chairman of the Interstate Commerce Committee of which Senator Cummings had long been chairman. The Iowa Senator is expected to become chairman of the Judiciary Committee in

the new Congress. Direction of questions affecting foreign relations is expected to be assumed by a Westerner for the first time in many years, if not in history, when Senator Borah, Idaho, will head the Foreign Relations Committee, made vacant by the death of Senator Lodge. There have been so many changes in Senate personnel by reason of death and election results as to require a complete revision of the Senate Committee in the new Congress after March 4.

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#### STEAM RETORTING OF OIL SHALE

The new steam retort which has been under construction by the Department of the Interior, at the Boulder, Colorado, field office of the Bureau of Mines, for some months, has been finished to such an extent that several trial runs have been made. This retort, which will be operated in cooperation with the State of Colorado, is essentially an element of a Pumpherson retort. The material to be retorted is fed downward through the retort, and superheated steam at a temperature of about 1200 degrees F. is admitted at the bottom of the retort. The superheat from the steam is transferred to the material by countercurrent flow. Bines are so arranged at the top and bottom of the retort that the process can be made continuous, and the feed mechanism is so controlled that it is possible to have a range of passage of material through the retort of from 15 to 50 pounds per hour.



## WHO MAKES THE PROFITS FROM OIL PRODUCTION?\*

*In General, Oil Companies Are Capitalized For Less Than Their Value—The Youth And Immaturity Of The Industry Has Brought About Misunderstanding — This Article Paints A Very Vivid Picture Of The Hazard Of Oil Development And Its Future*

By A. G. McLAUGHLIN†

THE public has learned to think of the oil business in terms of gushers and to regard the element of luck as the controlling factor in the industry.

The average man believes that all one has to do is to get into the oil business and then open a bank; but after he gets into the oil business, it usually happens that he finds that he should have opened his bank first.

In the few minutes I have today, I hope to give you in a sketchy way some of the outstanding facts concerning the oil industry and to try to show that this industry is one of the great basic industries of America and that upon its success depends the comfort and happiness of millions of people.

The fact that petroleum products can be bought in the far corners of the earth and that one can fill his automobile tank at every crossroads is evidence of the remarkable organization of this industry and makes it difficult for one to realize that the oil business is but 65 years old. However, such is a fact, as the business, as such, began with the drilling of the Drake well in Pennsylvania in 1859 and we will find, as we go along, that many of the characteristics of the industry are due to its youth.

You all know that petroleum is stored in the interstices of porous formations and that the fluid as it occurs in nature has in solution large quantities of natural gas under heavy pressure. Oil is a fugitive substance and migrates rapidly from place to place as soon as the deposit is tapped by the first well. Custom and law have decreed that petroleum is the property of him who reduces it to possession. Since a well draws oil from the surrounding area, it follows that the drilling of a well on one tract of land causes the immediate drilling of other wells on the surrounding tracts in order that each land owner may obtain his share of the oil. The inevitable result of this is that immediately after the pioneer well is drilled in a field, there becomes an intensive drilling campaign during which wells are drilled in large numbers as rapidly as possible, resulting in bringing to the surface a flood of oil which must be thrown upon the market regardless of price. It is often

difficult to absorb this flood of oil and a period of overproduction results. These recurrent periods of overproduction have always been characteristic of the oil industry since its beginning and they are with us today.

These recurrent periods of overproduction have, of necessity, determined the prices of petroleum products; that



A. G. McLaughlin

is to say, the price of petroleum products has been determined not by the cost of producing oil, but has been fixed by chronic overproduction of the raw material or, in other words, by supply and demand.

We hear much loose talk concerning the control of the prices of petroleum products, but I know of no industry in which the factor of supply and demand has controlled prices more than it has in the oil business.

We all know that the fuel of an automobile costs less than any other item of operation of the car, but how many of us have stopped to think that this cheap fuel has been due to the youth of the oil industry and to the periods of uncontrolled production? The cheapness of gasoline has been the direct cause of the amazing development of the American

automotive industry which in turn has created a remarkable demand for gasoline so that the two industries have developed hand in hand. There were less than 1,000,000 cars produced in 1915, and more than 3,500,000 in 1923. There were 311,000 cars in use in this country in 1909 and 15,250,000 cars in use in 1923. In fact, the output of automobiles has been so great that the petroleum industry, notwithstanding its enormous increase in the output of raw material, has at times been put to it to keep pace with the consumption of gasoline. We produced 183,000,000 barrels of crude oil in 1909 as against 726,000,000 in 1923, yet there was available 588 barrels per car in the former year and only 47 barrels per car in the latter year.

In each decade of the petroleum industry, we have produced more crude oil than we did in the whole history of the industry prior to that decade.

In 1900, the people of the United States consumed less than one barrel (0.84) of crude oil per person, whereas, in 1923, the consumption was 5.36 barrels per person, notwithstanding the fact that the population increased from 76,000,000 to 110,000,000. This gives one a fair idea of the amazing growth of the consumption of petroleum products and brings home to us that today, petroleum products are a prime necessity.

In order to meet this amazing increase in the use of petroleum products, it has been necessary for the industry to expand accordingly and to absorb correspondingly large amounts of capital. At the end of 1913, the total investment in the oil business was \$1,136,000,000. By the close of 1921 this investment had increased nearly six-fold, or about \$6,388,000,000, and today the total investment in the industry exceeds \$9,000,000,000.

An example of this absorption of capital is our own company. In 1904, there was used in our business \$22,742,000. In 1914, \$59,296,000, and today we are using in the business of the Associated Oil Company \$115,097,000.

The practical business mind (and especially that of a Scotchman) looks at the vanishing supply of raw material and wonders where are we going to get our money out of this industry? The consumption continues to increase and the absorption of capital goes on apace, and I wish to impress upon you that the profits of the petroleum industry will

\*Address delivered to Twenty-seventh Annual Convention, The American Mining Congress.

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never be known until the last item is entered and the books are closed.

The real romance of oil is the history of the wildcatter. In the early days of the industry, drilling oil wells was confined to the forested region of Western Pennsylvania, adjacent to the towns along the Allegheny River on farms which had been cleared. As the industry expanded, adventurous individuals went into the forests with their rigs and were said to be drilling among the wildcats. From this circumstance, the trade has preserved the word "wildcatter" to designate an operator who ventures a well in unproved ground.

In California, the average cost of a wildcat well varies from \$125,000 to over \$200,000, so that to undertake such a well is a venture of major importance. The result of this is that before undertaking a wildcat well, the average oil company brings to bear on the problem all of its best talent so that a careful study of the venture is made, both from the scientific and the practical standpoint. Notwithstanding this, during 1923 in the so-called Mid-Continent Field, comprising the states of Kansas, Oklahoma, Texas, Arkansas and Louisiana, there were 4,779 new leases taken for the purpose of drilling for oil and gas. All of these were actually drilled. Of the first wells drilled on these leases, 1,959 were oil wells, 438 were gas wells and 2,380 were dry holes or failures, showing that 49.8 percent, or practically one-half, were failures. These figures do not represent strictly wildcat operations as every new lease, whether in a proven oil field or not, which was initially drilled during 1923, was included. Exact figures showing percentage of successes and failures of wildcat wells have not been compiled, but it is the general impression among operators of long experience that if we are successful in one out of six wildcats, we are doing wonderfully well. This means, of course, that anywhere from \$750,000 to \$1,500,000 must be ventured before the operator is rewarded with success. As illustrative of this point, the Standard Oil Company has just abandoned an unsuccessful campaign in the wilds of the Philippine Islands upon which it has expended upwards of \$1,250,000. Another company entered the Wyoming field, spending more than \$1,000,000, and has never to this time obtained a barrel of oil. Another company, which is one of the successful operators in California today, invested more than \$8,000,000 in this state before they had obtained a substantial amount of production. I have personal knowledge of many unsuccessful drilling campaigns costing more than \$1,000,000. These are the unsuccessful ventures that must be reckoned in the final balance sheet.

It is interesting to turn to a successful venture and see what we have to place against the failures.

The Santa Fe Springs oil field, located almost adjacent to the city limits of Los Angeles, was probably the best known, the most phenomenal and possibly the most important field in the United States during its glory. It was commonly regarded as one of the bonanzas of the oil business and I believe that it fairly represents one of the more successful developments. The highly favorable geographical position of this field, in that it is situated on three lines of railroad, is traversed by one of the most important paved highways in Southern California and required only about 25 miles of pipe line to place its oil aboard tank steamers made it one of the most economic fields in the United States to develop, and one of the best located as regards the marketing of its production. Its nearness to existing pipe lines, the comparatively great ease and quick time in which wells could be drilled and the properly controlled dangers of water sands and gas blow-outs combined to allow the operators in the Santa Fe Springs Field to produce oil with less hazard, less cost and in shorter time than any field with which we have had experience in California. In fact, operating conditions in Santa Fe Springs were as nearly ideal as could be desired. This is, of course, contrasted with the average field, frequently situated in inaccessible deserts, far removed from pipe lines, railroads or roads.

In October of 1921, practically the inception of the field, the total production for the month was 7,688 barrels. It was not until September of 1922, however, that the field produced as much as 1,000,000 barrels per month. During this one year's time, operations were merely getting under way. From September, 1922, the production of the field gained about 1,000,000 barrels a month until, in August of 1923, its production had mounted to 10,000,000 barrels. Up to June 30, 1924, the total production of this field is recorded as 109,043,689 barrels. The average gravity of the oil was approximately 35 degrees Baume. The average selling price of the same oil up to this time was \$1.27. Thus the total value of oil produced in the Santa Fe Springs Field from its inception up to June 30, 1924, amounts to \$136,442,200. Of this \$136,000,000, 82½ percent was received by the owners of the land, the producers of the oil, the steel industry and the laborers in the oil fields. The other 17½ percent was divided between lumber companies, cement dealers, taxes, etc. The land owners received as primary royalties, secondary royalties, bonuses and participation profits, 41.9 percent of the total oil produced in Santa

Fe Springs up to and including June 30, 1924. The oil producers received 18.9 percent of the total oil produced, the steel industry received 11.2 percent and the oil workers 10.2 percent.

In the case of Santa Fe Springs we estimate that \$50,000,000 was paid to the land owners whose land produced oil and \$7,000,000 to the land owners whose land failed to produce oil. The land owners assumed no risks, expended no capital, but participated in the profits to the extent of nearly 42 percent.

The producer poured great sums of money into the pockets of labor, the land owner and other industries in order that he might meet his obligation to maintain the supply of crude petroleum and his participation amounted to less than 19 percent. He assumed all the risks and the hazards with a certain knowledge that he was engaged with others in a campaign of drilling which surely would result in decreased prices for his product and which might bring his house tumbling down about his ears.

During the development of the Santa Fe Springs Field, the producers have drilled 452 wells aggregating in depth 2,530,000 feet, or approximately 479 miles of hole in which they have placed 5,539,000 feet of casing, or approximately 1,051 miles. In drilling these 452 wells, the operators' cost approximated \$50,000,000, or an average of \$25 per foot. In addition to the wells drilled, the operators were compelled to build miles of road, cottages to house their employees and to install machinery for gathering and disposing of the oil.

The estimated recoverable oil remaining in the Santa Fe Springs Field is 18,000,000 barrels. Most all of this 18,000,000 barrels must be recovered by pumping methods which means the installation of additional machinery in the field at additional cost. The distribution of the value of this remaining 18,000,000 barrels will, in a large measure, be in approximately the same proportion as the values already recovered except that as the expense of production increases, the share of the oil company diminishes.

The total amount paid labor for its share in the development and operation of the Santa Fe Springs Field has been \$14,312,312, or about 10.2 percent. At an average wage of \$10 per man per day, this money would give employment to 1,000 men 7 days a week for 4 years. This is to say nothing of the number of men used in the manufacturing of the necessary casing, tools and other items incidental to the main item of labor. Among the miscellaneous items are a multitude of sundry necessities used in the development of an oil field. Some of these are steel cables, rubber belts,

(Continued on page 567)

# THE IMMINENCE OF AN OIL SHALE INDUSTRY IN THE UNITED STATES

## *An Estimate Of The Trend Of The Petroleum Industry And Of Its Influence On The Commercialization Of The Shale Oil Industry*

By LESTER C. UREN\*

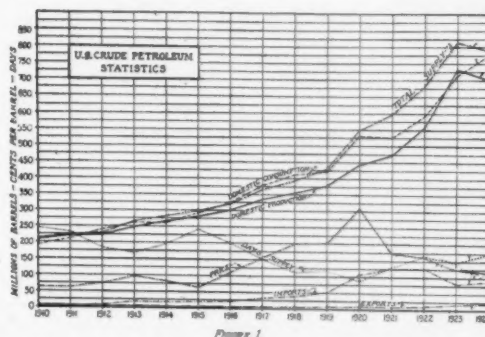
**D**EVELOPMENT of oil shale technology in the United States has been handicapped by a feeling of uncertainty on the part of all concerned as to just when the proposed industry would become a reality. Investors have been unwilling to risk money in a field of endeavor which may lie dormant for many years before commercialization is possible. Scientific investigators have not given the problems of shale technology the attention they deserve because an industry that is entirely prospective offers little in the way of remuneration or reward for the necessary expenditure of time and effort to prosecute research. It would be helpful both to those who are interested in placing the shale oil industry on a commercial basis and to those who are concerned with the development of the technology of the proposed industry if a clearer understanding of the probable time of its inception could be gained. The present paper is intended as a brief summary of the economic factors which will eventually determine when the shale oil industry in this country will assume commercial proportions.

### SELLING PRICE OF PETROLEUM THE DETERMINING FACTOR

The commercial production of any commodity is limited only by the profit that may be realized through its sale; that is, by the difference between its selling price and the cost of production, the latter being necessarily the smaller. When we can begin to produce shale oil at a profit and can foresee a continued opportunity to do so, then will the shale oil industry become a reality. The cost of producing shale oil may be rather definitely predicted even with our present limited knowledge of the nature and probable scale of the technical operations involved, but its probable selling price year by year into the future is a matter that cannot be estimated on any precise basis. The selling price of shale oil will undoubtedly be determined during the early years of the industry by the prevailing price of crude petroleum, its chief competitor in all of its principal fields of utilization. The probable future selling price of petroleum is therefore a matter of prime importance to us in our investigation of the economic factors surrounding the shale oil industry.

The selling price of crude petroleum is determined fundamentally by the prevailing and prospective demand for petroleum products and by the available supply. The future demand can be estimated from a study of the trend of past and present markets. Thus, an assumed increase in the price of gasoline during future years may be predicated upon the rate of growth of the automotive industries. The tendency of the important consuming industries to adopt fuel oil as a source of power is definitely limited by the availability of coal and hydro-electric power and by the prices at which they may compete. The available supply of petroleum for the future is best estimated by a study of oil reserves, both above and below ground, and of trend of production in the producing areas; that is, by consideration of whether production is likely to increase or decrease in each field. The probability of new discoveries adding to the present known reserves, and uncertainty regarding the quantity of additional petroleum thus to be made available, is the most disturbing element in the future supply situation.

Since commercial exploitation of our oil shales is so closely concerned with



the future of the petroleum industry, it will be important for us to gather such indications of the economic trend in this industry as the present situation affords. A fruitful field for study is found in past and present petroleum statistics. Figure 1 presents in graphic form the principal statistics of crude petroleum in the United States from 1910 to 1923, inclusive, with estimates for the year 1924. Careful inspection of these graphs will disclose the following facts:

1. That domestic production has increased year by year since 1910, the

average rate of increase in terms of the 1910 production being about 26.8 percent.

2. That domestic consumption has also increased each year since 1910, at an average annual rate of increase in terms of the 1910 production of 28.7 percent.

3. That during the same period of 13 years we produced in the United States 5,023,682,000 barrels of petroleum and consumed 5,353,484,000 barrels, or 329,802,000 barrels more than our total production.

4. That in only two years since 1912 have we produced more petroleum than we consumed, a situation made possible only by imports of foreign petroleum, chiefly from Mexico.

5. That this importation has been somewhat in excess of our domestic needs, a factor which has been chiefly responsible for the maintenance of a reserve of crude oil stocks of from three to eight months' supply.

6. That in terms of current consumption, our great reserve of about 360,000,000 barrels now in storage in the United States is really not in excess of the average ratio of stocks to consumption during the last 13 years.

7. That our estimated domestic production for 1924 will be not more than 700,000,000 barrels, a decrease of at least 32,000,000 barrels in comparison with the 1923 production, the first year in more than 13 years in which a decrease in production has been recorded.

8. That the present year's domestic production will actually be about 75,000,000 barrels less than our domestic consumption.

### OUR DECLINING PETROLEUM RESERVES

At various times the United States Geological Survey has estimated the apparent petroleum reserves of the United States in the existing fields and anticipated extensions of known fields. Obviously, no one can predict the total quantity of petroleum that will eventually be produced in this country, since new and unexpected supplies will doubtless be discovered in future years. As a measure of the apparent reserve, however, such estimates are of interest and will aid us in forming an opinion on the probable future course of production. In 1918, when the last estimate was made, we had an apparent reserve of something less than 7,000,000,000 barrels, a figure

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that has probably not been increased since that time. It appears that at the present rate of production our apparent supply would be exhausted in not more than ten years. Or, if this reserve is to be maintained, we must develop new reserves equivalent to our total annual production during each future year. If during any year we fail to find new reserves equivalent to our annual production, our apparent reserve must be partly depleted. In this event it will be found practically impossible to maintain our present rate of output, decrease in annual production operating in turn to increase the time of exhaustion of the reserves.

Our national production of petroleum is the composite result of the productions of a considerable number of different fields in all stages of development. Some are definitely on the decline, some are approaching exhaustion, some are in their prime—at maximum productivity—while other partially developed fields are approaching this condition. New fields in "flush production" contribute largely toward our gross output. More than half of the present production in California, for example, is obtained from fields discovered within the last three and a half years, and the same is true of the Oklahoma fields. Figure 2 shows a composite graph of the production records of old and recently discovered fields in California. Inspection of this graph will show that if the Santa Fe Springs, Long Beach, Huntington Beach and Torrance fields—all recent discoveries—had not been found, our 1923 production in California would have been only 76,000,000 barrels instead of 262,000,000. This statement does not quite reflect the true situation, since some production was shut in during 1923 in the older fields, but the state's production would not have been greater than 100,000,000 barrels in any case, without the newly discovered fields of the Los Angeles Basin.

Figures recently published by the American Petroleum Institute show that a few more than 2,000 of our 300,000 wells in the United States are responsible for one-fifth of the total production, and these very prolific wells are for the most part in our newly discovered fields. Some authorities have stated that about 30 percent of our national production is obtained from wells less than one year old. This is equivalent to saying that if during any year we should fail to develop any new fields our annual production would at once decrease 30 percent; hence we must develop 30 percent of our current production to maintain the existing rate of production.

More than half of all the petroleum produced in the United States up to the present time has been obtained from about 40 major oil "pools" or fields.

These have reached their production peaks at various times since 1900, as shown in the following table:

TABLE I—Showing Intensity of Field Development at Different Periods and Resulting Increase in Production.

Period	No. of major fields reaching production peaks	Annual production at end of period—Bbls.
1900-1905	4	134,717,000
1905-1910	4	209,557,000
1910-1915	7	281,104,000
1915-1920	10	442,929,000
1920-1923	15	732,407,000

There are at the present time not more than half a dozen new fields in the United States that may conceivably furnish flush production in important amounts during the next year, and only one or two of these seem to compare in productivity with the more important producing fields among the eight reaching their production crest in 1923.

The above figures indicate that recent important increases in domestic petroleum production have resulted through discovery of an ever-increasing number of new pools. The bringing of eight important new fields to full development in a single year, 1923, is the primary reason for the great production of that year, a coincidence of production peaks of new and important fields not likely to be duplicated in future years. More successful application of the principles of petroleum geology and improved deep well drilling technique have been largely responsible for the remarkable results of the last three years. We have been rapidly "pyramiding" production until we are approaching—or perhaps we have reached—a rate of production which seems definitely limited by our known petroleum reserves and by the ever-increasing difficulty of finding new reserves.

In 1924 production will apparently decrease about 32,000,000 barrels in comparison with the production of 1923; hence, in spite of the prolific new fields discovered within the last year or so, we are apparently not maintaining production. Existing production figures may be somewhat unreliable since some potential production is "shut in" in some of our older fields; but even with due allowance for this, it is clear that production has barely been maintained during the past year; and yet this has been a rather active year in which a normal number of new wells have been drilled, a year characterized by the discovery of a normal number of new pools.

As time elapses and our probable and possibly productive areas are tested by the drill, the discovery of new pools will become less and less common. While the urge of oil scarcity and high future oil prices will eventually justify a more thorough search for new deposits than has yet been made, it seems probable

that the more obvious petroleum deposits in this country have already been found, and that future exploration must be far more costly and uncertain in its results.

From the foregoing discussion of the salient economic features of the oil producing industry, we are apparently justified in the conclusion that the year 1923 represented at least a temporary peak in petroleum production in the United States, a rate of production from which there has been during the present year a moderate decline which in all probability will continue into 1925. Whether or not the 1923 production represents the real crest of our domestic petroleum production no one, of course, can say, for it is impossible to foresee the discovery of new and at present unknown fields. If during the next few years a considerable number of very prolific fields should be simultaneously brought to full production, we may conceivably carry our petroleum production to hitherto unreached figures. The probability is, however, that we shall be unable to do this, not only because new pools are increasingly difficult to find but because the present condition of the petroleum market does not encourage any unusually active drilling campaign during the next year. A few years hence our present prolific producing fields will have so far declined that more than the usual number of new discoveries will be necessary to maintain the present production. These circumstances seem to warrant the conclusion that we are at least approaching the crest of our petroleum production if we have not already passed it. In all probability there will be no very sharp decline, since the continued discovery of occasional new pools will tend to approximately maintain the present rate for a few years at least. Gradually, as new discoveries become fewer, the production of the new pools in the country's total will be less important, so that a continued moderate decline may be looked for.

#### THE TREND OF CONSUMPTION

Turning now to the other side of the oil industry's ledger—the consuming industries—we find a somewhat different situation. Figure 1 shows that during the last ten years consumption of petroleum has been increasing more rapidly than production; that during 1924 we shall probably consume about 75,000,000 barrels more than we produce. Our imports for the year will probably be slightly less than that necessary to make up the deficit in our domestic supply plus our exports of about 19,000,000 barrels. However, due to potential production at present shut in in several of our most productive fields, it is not considered likely that we shall have to draw upon accumulated stocks to any great extent during the next year.

Figure 1 shows that in only one year since 1910 has consumption of petroleum failed to increase. This was in 1921, a year of great industrial depression; and even so, the decrease in consumption was very slight. There is ample evidence to justify an optimistic outlook for petroleum consumption during the coming year. During the present year the industry has enjoyed an unprecedented demand for gasoline. Gasoline consumption in 1924 will probably be 1.4 times that of 1923. The number of automobiles in use in the United States will increase about 20 percent during the present year in comparison with the number in use in 1923; and automobile manufacturers tell us that the "saturation point" for automotive vehicles in the United States has not yet been reached. There is also a healthy demand for fuel oil, a field of utilization which is being greatly expanded at the present time through the more extended use of oil

burning furnaces instead of coal burners for domestic heating. The lubricating oil and illuminating oil markets are also on the increase. With the revival of trade in Europe, which seems likely to result out of the recent economic adjustments in Germany, demand for oil abroad should increase. There is no apparent reason why the normal rate of increase in petroleum consumption of about 28.7 percent of the 1910 production—already established as an average figure for the last thirteen years—should not continue into 1925 and later years.

The price of any commodity is measured by the algebraic sum of the supply and demand factors. If supply is increasing in greater ratio than demand, price will be depressed; and if the price is to increase, it must be the result of either increase in demand relative to supply or decrease in supply relative to demand. These are self-evident economic truths that form the basis of future price estimates.

The petroleum industry has erected and maintained a bulwark to protect itself against frequent and extreme fluctuation in price, in its storage reserve. During recent years there has been in storage above ground in the United States, from three to six months' supply of crude petroleum, in addition to smaller quantities of refined products. Variation in quantity of oil in storage

and the rate of addition to or depletion of storage reserves, is in itself a measure of the many complex variables that enter into the supply and demand factors. Within relatively short periods of time, one may estimate the probability of increase or decrease in price by a study of storage statistics.

It will be important in this connection to give consideration to regional variation in price. The product of any given field is limited to markets in which the product of other fields may not compete at a lower price. Transportation cost is the controlling factor which determines

future price should, in the main, respond to changes in the crude stocks in storage. As the ratio of supply to current consumption decreases, we may confidently expect higher prices and, within limits, the prevailing price will increase in indirect ratio as the number of days' supply in storage decreases.

#### A FORECAST

Assuming that we have properly interpreted the trend of supply and demand: that the demand for oil will increase during the next few years at the average rate established over the last 14 years, but that domestic production will decrease or at least remain about stationary, it will be of interest to investigate the probable effect on storage reserves and the accompanying price reaction. In offering these figures concerning future production, consumption and supply, the writer does not wish to be understood as in

any sense offering them as predictions, for the data are clearly too uncertain to justify anything more than estimates of probable trend. The figures are offered merely to indicate the rapidity with which important price changes may be effected in the event that production and consumption during the next few years follow the present trend.

If our consumption of petroleum in this country increases at the average rate established over the last 14 years, we will consume the quantities indicated in the following table:

TABLE 2—Estimated Demand For Petroleum, 1925-1929

Year	Consumption, bbls.
1925.....	825,000,000
1926.....	880,000,000
1927.....	930,000,000
1928.....	980,000,000
1929.....	1,030,000,000

If we assume that our domestic production may not be increased during this five-year interval above the 1923 level of 728,000,000 barrels, our domestic deficiency will approximate the figures given in the following table:

TABLE 3—Estimated Discrepancy Between Supply and Demand For Domestic Petroleum.

Year	Deficiency, bbls.
1925.....	100,000,000
1926.....	150,000,000
1927.....	200,000,000
1928.....	250,000,000
1929.....	300,000,000

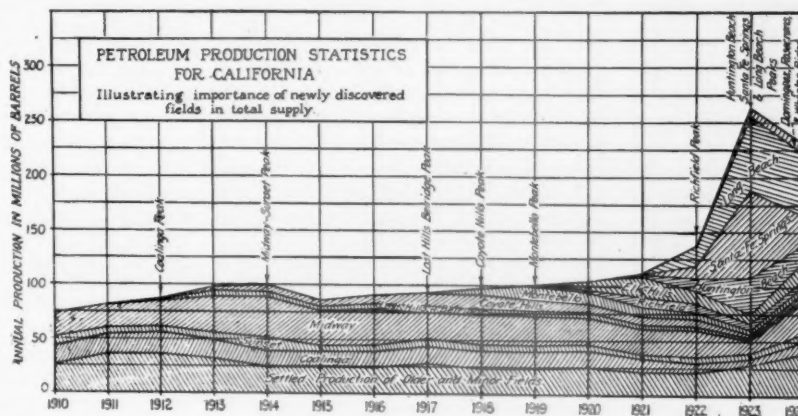


FIGURE 2

the economic radius of competition for the products of any field, but the economic radius is not constant and fluctuates with change in the price of oil and with the cost of transportation.

The market price of crude petroleum is very sensitive to moderate changes in the apparent supply. Reference to the graphs of Figure 1 will show a very suggestive relationship between the average price and the days' supply in storage. So close is this relationship that one could almost predict the price if he knew the number of days' supply. This is true at least up to 1922. Since 1922, some readjustment has occurred in the price structure which resulted in an apparent discrepancy in the established relationship between price and supply for the year 1923. Decrease in the number of days' supply during 1923 should have brought about an increase in price rather than a decrease. This change in the economic balance is possibly due to the recent extensive movement of low-priced California oil through the Panama Canal to the Atlantic seaboard, which has resulted in a material decrease in the average national price of crude, though the supply when expressed in terms of demand is not abnormal. Anticipated decline in the California production will in all probability gradually restore the prior relationship.

Consideration of the trend of the market price of petroleum indicates that the

The extent to which we may import foreign petroleum from Mexico and elsewhere will determine the extent to which these figures may represent actual reduction of our storage reserve. Assuming that an average of upwards of 100,000,000 barrels of Mexican and South American oil will find its way into American markets, during each of the next five years, our crude stocks would be depleted as follows:

TABLE 4—*Estimated Crude Petroleum in Storage in the U. S.*

Year	Storage reserve, bbls.	Days' supply
1925.....	360,000,000.....	160
1926.....	310,000,000.....	128
1927.....	210,000,000.....	82

If the assumptions on which the data of the foregoing tables are based are approximately true, our days' supply of petroleum will be depleted to below the 1920 level about three years hence. In 1920 when our days' supply of crude petroleum reached its minimum—for recent years—of about 87 days, the average price was more than \$3 per barrel; and hence, if our relationship between days' supply and price can be expected to hold, we may again expect \$3 oil about the end of the year 1927.

The cost of producing crude shale oil in commercially important amounts under favorable conditions in this country, cannot yet be said to have been definitely established. Such estimates as have been offered—notably before previous sessions of the American Mining Congress—range from as little as 68 cents to as much as \$4 per barrel. A conservative figure somewhat above the probable actual cost would apparently be about \$3. Whether or not agreement may be reached on this point, it seems clear from the reasoning presented above, that a market price for petroleum at which shale oil may compete is possible within three years. As to the probability of this, different individuals will not, of course, agree; differences in viewpoint depending largely upon their ideas of the probability of recurrent discovery of new fields in sufficient numbers to further increase production.

Oil producers are inclined to be overimpressed with the admittedly adverse market conditions of the last year or so. They naturally regard the present outlook through the screen of pessimism that has been created by the depressed scale of petroleum prices attending the recent period of over-production. A broader gauge view of the outlook for the coming years should be encouraging rather than otherwise. We have in prospect an enormous and rapidly expanding market with, in all probability, an increasingly wide gap between supply and demand, occasioned by waning production: conditions which cannot fail to result in higher oil prices. The cost of

producing petroleum, on the other hand, does not seem likely to materially increase; hence profits will be greater. The oil industries will thereby receive new stimulus; there will be greater activity in the development of new sources of supply, and among these we confidently expect shale oil to receive the attention it deserves.

#### NECESSITY FOR DEVELOPMENT OF A SHALE OIL INDUSTRY IN ADVANCE OF ACTUAL NEED

From the economic point of view and from the standpoint of national security against a serious oil shortage some years hence, it is highly important that prompt steps be taken to establish a shale oil industry on a commercial basis at an early date. A shale oil industry capable of supplying any appreciable part of our present petroleum needs cannot be developed over night. To produce say, 25 percent of our present oil supply from this new source would require a capital investment of perhaps half a billion dollars. Shale mines must be opened and equipped. Crushing and sizing plant, retorts and specialized refinery equipment must also be erected. New working communities must be established and power and water supply developed in new regions. We cannot as yet be said to have reached general agreement on the type of equipment to be used in retorting. Satisfactory refining processes have yet to be worked out. There is a great deal of research necessary before all of the technical problems confronting the producer of refined shale oil products can be said to have been fully solved. But above all, we are going to need in the shale oil industry a corps of trained oil shale technologists. Our highly technical shale oil extraction plants and refineries are going to require the services of thousands of well-trained engineers of peculiar and very specialized qualifications. Probably not 100 men really qualified in this kind of work could be found in this country at the present time. Most of our engineering schools are making no direct effort to increase the supply. When need for rapid development of the shale oil industry is eventually realized by the American public, shortage of trained personnel will be one of the greatest handicaps.

In view of the necessity for creating activity in shale oil production several years in advance of the actual time at which the product of such an industry will really be needed, some artificial stimulus should be given the shale oil industry in the near future. Our government is probably the only agency that could do this effectively. Erection of several shale plants of large capacity by the government in various parts of the United States to supply oil for the potential needs of the Navy, would be a justi-

fiable enterprise at the present time, and would go far toward overcoming the inertia existing in the shale oil industry, and would accomplish a great deal in the solution of the technical problems involved. It is perhaps idle under present conditions, to talk of subsidizing the shale oil industry by the offering of a government premium on shale oil, but our government has found such a policy desirable in the case of the silver-producing industry within recent years, and the need for silver at the time was of small importance compared with the present need for activity in the development of a shale oil industry to be in working condition, say five years hence. This might be accomplished by the government specifying shale oil and shale oil products in its own purchases; a policy which would also be fruitful in providing for large scale utilization of shale oil products under conditions that would permit of careful study of any possible changes in specifications and manner of use that might be necessary with the new products.

#### CONCLUSIONS

Based on the premise that the advent of an oil shale industry of commercial importance cannot result in this country until the price of petroleum reaches a materially higher level than at present, an effort is made in the foregoing pages to analyze the factors controlling the price of petroleum, and to forecast the probable future price trend. A statistical review of the petroleum industry during the last 14 years reveals the fact that both production and consumption have rapidly increased, but that the domestic supply for the period, as a whole, has failed to keep pace with the demand. It appears that production reached a peak in 1923, and that the present year will witness a moderate decline in production, which, in conjunction with a normal increase in consumption, will occasion an estimated deficit for the year 1924 of about 75,000,000 barrels. This deficit will be offset by oil imported from foreign sources of supply. It has been shown, also, that while stocks of petroleum in storage have increased to a high level, when measured in terms of current consumption, they are not abnormal.

Our apparent reserve of petroleum below ground is shown to have reached the lowest level yet recorded. Emphasis is placed on the fact that increase in or even continuance of our present rate of production is vitally dependent upon the recurrent and timely discovery of new pools, which account for a large percentage of current petroleum production. It is shown that our rapidly increasing production and the growing scarcity of favorable regions for exploration, makes maintenance of production increasingly



difficult. The conclusion is reached that domestic production will not be greatly increased during the next few years, at least, above the 1923 level, and the suggestion is offered that the year 1923 may reasonably represent the crest of petroleum production in the United States.

A study of the trend of consumption disclosed no adverse factor to limit continued increase in demand according to the average rate established during the last 14 years. Consideration of the relationship between the supply of petroleum in storage and the market price, disclosed the interesting fact that price varies quite uniformly with the apparent storage reserve, the market price, in the main, varying in inverse ratio with the number of days' supply of crude petroleum in storage.

Based on the assumptions that domestic production would not be increased during the coming years, but that demand for petroleum would continue to increase for a time at the established rate, figures are offered which indicate that the present storage reserve would be depleted within three years' time to levels that would justify an advance in petroleum prices to upwards of \$3 per barrel. At such a price, if there is promise of it being sustained, it is considered probable that shale oil could compete on a commercial basis.

The necessity for early development of a shale oil industry in the United States in anticipation of its probable need in relieving an oil shortage some years hence, is emphasized and the difficulties incidental to its commercialization are outlined. The desirability of government support during the early period of development is suggested.

## PROFITS FROM OIL PRODUCTION

(Continued from page 562)

feed pumps, water, road construction, repair shops, explosives, corrugated iron, sand, crushed rock, automotive equipment, freight costs, etc. The mere naming of these items indicates to you in some manner what a great many industries finally share part of the value of each barrel of oil produced.

One would think from the risks involved and the profits obtained that the industry would not be justified in undertaking the development of a pool such as Santa Fe Springs, but we must remember that behind this development is the investment of billions of dollars in pipe lines, tank steamers, refineries and marketing facilities which must be employed to deliver to the motorist his daily quota of gasoline and motor oil. The urge of the demand and the nature of the business are such that the producer of oil is frequently forced into a develop-

ment program on a much more extensive scale than he would undertake were he free to develop the lands as his judgment dictates.

It is common knowledge that the oil business has been a profitable business and is a fairly profitable business today; but I submit that a careful study of the facts concerning this industry will disclose that the oil business is no more profitable than other types of business. For example, the Associated Oil Company, since its inception, has paid its stockholders an average of about 3 percent on the capital stock. It took this company from the date of its organization, in 1901, until 1916, or a period of 16 years to really place its stock upon a fair dividend basis. In the year 1916 we paid 4 percent and since that time we have paid 6 percent annually. The industry, as a whole, actually earned less than 13.2 percent in the decade from 1913 to 1923. In 1921 the earnings of the industry had fallen to 7 percent on the actual outstanding capital and but 4.3 percent on the net worth of the assets employed in the industry. In order to protect their stockholders against inevitable decline in producing fields and the capital losses resulting from the obsolescence of pipe lines, it has been the custom of conservatively managed companies to plow back into the business a considerable part of their profits so that the net amount of capital employed in the industry far exceeds the capitalization of the companies involved.

As illustrative of the necessity of re-investing earnings, during the years 1922 and 1923, about 525 wildcat wells were drilled in the state of California. We have fairly accurate estimates of the cost of 389 of these wells which amounts to in excess of \$15,000,000. As time goes on it is evident that the percentage of failures in prospecting will become greater and greater. It is now and will always be the duty of the larger oil companies to carry on the costly wildcatting in this state. For example, during the first six months of 1924 it is estimated that \$8,000,000 has been spent in California in drilling wildcat wells, which have brought forth little or nothing in the way of new discoveries.

I believe that thoughtful consideration of the facts which I have brought to you will convince you that I was right in stating that one should first open his bank before he gets into the oil business.

## CURRENT OIL SHALE NOTES

**T**he Crozier retort, installed and operated at Wembley in connection with the recent London exhibition, treated several tons of Tasmanian oil shale successfully. A yield of 40 gallons to the ton was obtained. Oil shale

activity is noticeable in Tasmania which has a deposit estimated to contain 42,000,000 tons. The Crozier retort, designed primarily to treat Burma-Siam oil shale, is capable of treating 500 tons daily. Besides a large daily throughput the retort can be installed cheaply, entails low operating cost and produces fractionated and partially fractionated products in one operation.

The Government has withdrawn from entry, and added to the oil shale Naval Reserve in Colorado, 23,000 acres of oil shale land. This action was taken primarily to increase the potential supply of oil for the use of the Navy and to give a wider range of operations in developing the acreage. The tract will be known as Oil Shale Reserve Number 3, is contiguous to Reserve Number 1, and lies in the vicinity of Rifle and Grand Valley, Colorado.

The petroleum engineering course, recently introduced at the Colorado School of Mines, offers the only complete four year curriculum that is given in this country. The curriculum covers production, transportation, refining, and marketing of oil and its products. The technology of oil shale is included. The degree of P. E. (Petroleum Engineer) is awarded on the completion of the course.

The Bronder American retort is now being tried out in Australia by the Australian Oil Shale Corporation, Ltd., at Wirths Park, New South Wales. The experimental plant produces 12 gallons of oil an hour. The oil shale treated was taken from the Murrundi deposit and yields 70 gallons of oil to the ton.

The National Oil Shale Conference in Sacramento was the most successful conference thus far held. Special interest attached to the governmental interest in oil shale shown by the action of the Navy in seeking a dependable supply of oil—a supply that could not be drawn away by adjoining wells, as in the case of well oil, but could be absolutely depended upon in time of need. Oil produced from oil shale meets the most exacting requirements of the Navy. If the \$90,000 item of the Deficiency Appropriation Bill is allowed, as is confidently expected, at the coming session of Congress, steps will at once be taken to exploit the Oil Shale Reserves both as to the quality and quantity of potential and also the best method of production.

World wide interest in the production of oil from oil shale is becoming more and more pronounced. The fundamental reason for such interest is the acknowledged need of oil in industry. Countries like France, Spain, England, Estonia, Sweden, Australia, Tasmania, and Brazil that have no local oil pools must now depend upon foreign oil production imported at high cost.

## THE MINING INDUSTRY OF BRITISH COLUMBIA\*

*British Columbia's Mining Industry Needs Both Capital And Prospectors Of the Old School—This Article Outlines Its Present Condition And Future Possibilities*

By HON. WILLIAM SLOAN†

THE needs of the mining industry in the Province of British Columbia is a broad text, and in contemplating the mining history of this northern country the present conditions and the future possibilities become visualized. Getting down to fundamentals, at once I would say that British Columbia's requirements in a mining sense may be summarized as being (a) prospectors and (b) capital.

There are not as many prospectors going into the hills now as is desirable. Distant fields do not now possess the glamor that they had in the early days because in the march of civilization, particularly in the development of transportation and news distribution, little is left to the imagination as to the physical characteristics and the material possibilities of those lands of which we do not happen to have personal knowledge. There is not the same disposition to wander and consequently we do not as frequently find that type of pioneer miner who was a notable figure in the early history of America.

The prospector of our generation is a different specimen of the genus homo. He is not in any respect inferior, for what may be lacking in the information acquired by experience is fully compensated for by his deeper knowledge of geology and mineralogy.

Our schools and our colleges are turning out young men to know mineral and to classify it when they find it in rock. It is gratifying to be able to say that the importance of this phase of learning is being recognized in an increasing degree. We need more young men not only who know mineral when they see it in place but who are prepared to go into the hills, rough it, locate their claims and develop them.

In British Columbia we have been working to this end both through the University of British Columbia and by means of lectures given by government mining engineers in their various dis-

tricts during the winter. Full advantage is being taken of these opportunities, and the policy I am sure will be justified in the training of the kind of prospectors needed in speeding up mineral development.



Hon. William Sloan



A. G. Langley

four more or less continuous chains of mountains, between which lie valleys of varied width. Each of these mountain ranges has been proved to contain mineral in sufficient quantity to be profitably mined, while the valleys of the interior, lying immediately to the west of the Rocky Mountain range proper, contain placer gold throughout their whole length. About 250,000 square miles of this vast country, known to be extensively mineralized, still remains a virgin field for the prospector and for the investor in undeveloped "prospects," a field such as exists today in but few other places in the world.

We have not, however, been idle. We have produced \$76,962,203 of placer gold,

\$113,352,655 of lode gold, \$63,532,395 of silver, \$179,046,508 of copper, \$58,132,661 of lead, \$27,904,756 of zinc, \$250,968,113 of coal and coke, \$39,415,234 of building stone, etc., and \$1,408,257 of other miscellaneous minerals; a total production of \$810,722,782.

This, we believe, is an admirable showing, especially when it is remembered that lode mining was not started until very recent years. The value of our mineral production in 1923 was \$41,304,320, an increase over the previous year of 17.5 percent; while in point of tonnage the production of 1923 was far in excess of that of 1922. The prices of lead and zinc are now favorable for economic production, and as the market for these metals shows strength with a tendency to increase the rich silver-lead-zinc areas of the province are particularly attractive to the mining investor. In the area known as the Kootenay District there is considerable activity, and among the numerous producers we have the great Sullivan mine, owned and operated by the Consolidated Mining and Smelting Company. This mine ranks among the leading producers of lead and zinc in the world. This year its production has been substantially increased, which will be reflected in an increased production of lead and zinc for Canada. Some 3,000 tons a day are now being concentrated. The concentrates are shipped to the company's metallurgical plant at Trail, where the metals are extracted and refined. At this great plant the ores of silver-lead, zinc, copper and gold are accepted from independent shippers for treatment. Among the gold and silver producers we have the Premier Mine, Portland Canal, a property which has distributed since 1921 the sum of \$6,088,000 in dividends. Our metalliferous mines have paid dividends of, roughly, \$46,000,000, the greater part of which has been earned in the past 30 years. This, it is to be remembered, is the bare sketch of achievement, most of which has been concentrated within the past quarter of a century. It is, you will agree, a creditable record for a province in which not more than 15 percent of the mineralized area has been well prospected and the population of which has never been much greater than 500,000.

Considerable, also, has been done in coal mining. The first notably discovery of coal in British Columbia was recorded in 1848 on Vancouver Island, but some 40 years elapsed before it was seriously exploited. Since then there has been

\*Paper delivered by Mr. Langley for Mr. Sloan to Twenty-seventh Annual Convention, The American Mining Congress.

†Minister of Mines, British Columbia.

produced coal and coke from the Island, Central Interior and Crow's Nest fields, to the value of \$250,968,113, the coal output aggregating 61,658,566 tons. While these statistics are interesting they give no adequate indication of the possibilities of the available resources. There are coal-bearing lands in the Crow's Nest, in the Peace River District, and in what is known as the "Ground Hog" District of the Northwest, contiguous to the Canadian National Railways, which are lying as nature placed them, uncovered only sufficiently to let us know they exist and something of their extent, but as yet undeveloped and unexploited.

As I have said, we have done what it is possible for a people; weak numerically but strong and highly endowed in the extent and the natural wealth of its heritage, to do in the comparatively short time since the inception of mining in the Northwest.

Capital is absolutely essential. The necessity of financial support in a sparsely settled and undeveloped mineral-bearing country as expansive as British Columbia must be clear. It is gratifying to me to be able to say that in recent years the mining industry of our province has been receiving greater attention than in the past at the hands of those in control of capital. There is a disposition on the part of these corporations, or syndicates, or individuals, however, to wait until a mining prospect is conclusively proven as an economic enterprise before becoming interested. They are inclined to let the man or men with small means shoulder the responsibility of investment until the mineral showing is brought to the point where sufficient ore of a paying character is available to warrant the necessary preparations for treatment and shipment. I should like to see capital come with greater freedom to the aid of the miner when he is struggling to prove up his claims. There is no reason why strong financial interests should not share with those who have found and staked the ground in the early expense and risk of loss that is entailed at that stage of development. Where surface showings are good and where geological conditions are right the miner is entitled to encouragement. The mining business by its very nature cannot be judged as to its attractiveness as an investment as are ordinary commercial enterprises. It is not a matter of cold calculation but a business in which, at the outset at least, some chances must be taken. By the exercise of care through the use of the knowledge of our skilled geologists and mining engineers we are able to very materially reduce the element of chance, but it cannot altogether be effaced, and it is right that capital should share with the prospector and the miner to a

greater extent than at present in this phase of development. The capitalist who makes an offer on a property on the basis of the value of the proven ore, with some allowance for other values which are plainly indicated as existing, is not entitled to the same thanks as is he who, on the recommendation of his engineer, takes hold of a prospect and brings it to production.

To all who are looking for mining investment, however, I can assure opportunity in British Columbia. I have referred to the silver-lead-zinc ores of the Sullivan mine at Kimberley and to the gold-silver ores of the Premier mine, but it is to be borne in mind that we have other lode and placer camps in the province which have materially contributed to the mineral production of the Northwest and which have years of active and profitable life ahead of them. There are many rich silver-lead mines in the Slocan and other parts of the Kootenays; there are the copper-gold deposits of Rossland and the copper of the Boundary District; there are the copper-bearing ores of Howe Sound which the Britannia Mining Company is exploiting with enterprise and profit; there are the copper-bearing zones of the northwest coast which the Granby Company has been developing for years and on which it still is engaged; there are immense magnetite deposits both in the interior and on the coast of the province which as yet have seen little development but which I am confident will yet become the basis of a great iron and steel industry; and there are the placers of the Cariboo, the Peace River and the Cassiar District in the north which will yield largely in the future to the individual miner but perhaps in greater volume to the hydraulicking and dredging operations. These facts, together with the fact already stated that 250,000 square miles of mineral-bearing land remain to be prospected, should be sufficient to drive home my point that opportunity awaits the enterprising investor.

The mining laws of the province are more liberal and the fees lower than those obtaining in any province of the Dominion or any colony of the British Empire. Mineral locations are granted for nominal fees and absolute titles are obtained by developing such properties, the security of which is guaranteed by crown grants. Taxation is comparatively low on mineral production. There is a 2 percent tax on the assessed value of ore raised from the land, the value of the ore being determined by smelter returns. There also is an income tax which applies only where the profits have reached such proportions that the levy exceeds what the 2 percent tax would return and then the amount of the latter tax is credited to the operator or the operating company. Allowances are made for

depreciation and depletion of mining properties. As the importance of encouraging the industry is fully appreciated by the Government and as the bearing of taxation on mining development is recognized, further refinements of the regulations are under consideration. It is suggested that profits which are reinvested in mining in the province, either in the further development of the property from which they were taken or in other properties, should be exempted from taxation. This is seriously considered and it is trusted that it will be possible to announce shortly that a favorable decision has been reached.

We have six government mining engineers permanently in the field. It is their duty to inspect mining properties in order that skilled direction may be given miners who are unable to engage their own professional advisers. It also is their duty to recommend the expenditure of money in the construction of trails, roads and bridges to mines or prospects where, in their judgment, the present or prospective value of the latter warrants the same. Since the year 1917 to the present, 1,068 miles of roads and trails to mines or prospects have been constructed in British Columbia, and 6,348 miles of such roads and trails have been maintained at an expenditure of approximately a million dollars.

The policy of the British Columbia Government has been to promote stability in its administration of mining. The mineral act of the province has stood for many years without change or amendment affecting the fundamental principles upon which it rests. Under its provision even-handed justice is assured the prospector, the miner and the mining company or corporation. There are no special favors, but the just rights of all have been amply safeguarded. It is accepted as the vital basic principle of mining administration in the province that the privileges of the free miner, as set out under the terms of the mineral act by the Legislative Assembly of British Columbia, shall continue and that the statutory guarantee of mining titles shall be maintained.

The mining needs of British Columbia, let me repeat, can be placed under the two headings, "Prospectors" and "Capital." The more of both we get the better for our industry. There is plenty of the raw material waiting in the Canadian Northwest, and we extend the same cordial invitation to our neighbors to the south as we do to our fellow citizens in other parts of the British Empire to assist us in the development of the natural mineral resources with which our country is so richly endowed.



## PUBLIC LAND OFFICE

(Continued from page 540)

it was not until 1866 that we had any general mining law that authorized the acquisition of title to the precious minerals. But when this law was enacted, it carried into its measures the wisdom and experience born of actual mining operations, from the grub stake prospector to the largest operator. Nothing was overlooked that could reward diligence in discovery or development. But no policy of Congress that finds statutory expression with respect to our natural resources, be they precious minerals, coal, or water power, can effect its purpose without the vitalizing forces of intelligence, cooperative industry, in which are blended the combined efforts of the individual citizen and organized capital, under economic conditions that protect the rights and insure the rewards of each equally. To this end you are met in council; your conclusions will be of far-reaching effect, not only in the immediate matter of mines and mining, but in the broader consequences in the world of trade and commerce, transportation and distribution; for this, after all, is the mark of your high calling. I thank you for this opportunity to contribute in a small measure to the material that will be handled by this body in its ultimate conclusions; and in this respect I speak not only for myself, but for the Secretary of the Interior, who appreciates the opportunity that lies in your hands at this time to build still stronger the bulwarks of our present national prosperity.

## UNAPPROPRIATED PUBLIC LANDS

THE United States Government has disposed of 1,048,278,220 acres of its public domain up to the end of the past fiscal year, it was announced at the Interior Department.

This represents more than 60 percent of the entire land surface of the country exclusive of Alaska and other territorial possessions. The entire area of the United States totals 1,903,289,600 acres, and the area of the 13 original states, including Texas, amounted to 460,917,120 acres, leaving 1,442,372,480 acres included in the public land states.

Disposition by the government of this immense area through the General Land Office of the Interior Department has been made under various acts of Congress. The largest amount was disposed of through homestead entries, commuted entries, and sales to the general public, the figures reaching 523,968,514 acres. The second largest was in railroad and wagon road grants by the government, 161,539,168 acres being disposed of in this way. The third was by educational and other grants to state governments, the amount being 137,668,490 acres.

Some of the other means by which the government has distributed its public land included: 64,086,867 acres in military bounties to soldiers and sailors serving in the various wars; 13,730,124 acres under the timber and stone land laws; 9,489,060 acres under desert-land laws; 10,866,888 acres for timber culture; 64,719,004 acres in swamp land grants to states; 34,684,164 acres in confirmed private land grants; 25,785,091 acres in allotments to Indians; 1,137,324 acres under the Carey Reclamation Act; 603,526 acres under the coal land laws.

The approximate area of unreserved unappropriated public lands outside of Alaska still owned by the United States up to the close of the last fiscal year amounts to 186,604,733 acres.

The public lands are located in 24 states and are exclusive of forest reservation, Indian reservations, other reserved lands and the Territory of Alaska. The state having the largest unappropriated public domain is Nevada with 52,282,278 acres. Utah comes second with 28,767,687 acres. Third on the list is California with 19,626,172 acres. The state having the smallest area of public land is Kansas with 2,038 acres. Out of the 48 states of the Union there are 24 that no longer have public lands within their boundaries.

A list of the states with estimated acreage of public lands still owned by the government up to the end of the last fiscal year follows:

Alabama ....	36,140	Montana ....	6,784,286
Arizona ....	13,896,860	Nebraska ....	30,671
Arkansas ....	235,599	Nevada ....	52,282,278
California ....	19,626,172	New Mexico ..	16,363,769
Colorado ....	7,596,970	North Dakota ..	131,659
Florida ....	79,606	Oklahoma ....	34,533
Idaho ....	9,811,031	Oregon ....	13,420,221
Kansas ....	2,038	South Dakota ..	242,005
Louisiana ....	8,876	Utah ....	28,767,687
Michigan ....	71,691	Washington ..	1,209,385
Minnesota ....	264,225	Wisconsin ....	4,652
Mississippi ....	18,546	Wyoming ....	15,687,833

There are 338,000,000 acres of unreserved public lands in Alaska.

Operation of the stone quarries required the services of 92,455 men in 1923, a larger number than has been employed in this industry since 1915, according to a review issued by the Bureau of Mines. A total of 25,545,859 shifts were worked, constituting an average of 276 work-days per man. Accidents during the year killed 143 men and injured 14,990, indicating a fatality rate of 1.68 and an injury rate of 176 per 1,000 full-time, 300-day workers. The corresponding rates for 1922 were 1.92 killed and 172 injured; for the five-year period, 1916-1920, similar rates were 2.10 killed and 160 injured.

Dr. Alfred Hulse Brooks, 53 years old, chief Alaskan geologist of the Geological Survey for the last 21 years, died November 22, in Emergency hospital, where he was taken after being stricken

with apoplexy while at his desk in the Interior Department.

He was appointed to the Geological Survey in 1894, following six years of temporary field service. Under his leadership the principal features of Alaska were accurately mapped and its mineral resources investigated, the results being recorded in hundreds of official volumes. He made more trips to the territory and tramped and canoed more miles through its wilderness than perhaps any other Alaskan explorer. In 1911 he was made vice chairman of the first Alaskan commission, which mapped out railroad routes in the territory.

In the world war he was chief geologist of the American expeditionary forces in France, having the rank of lieutenant colonel.

He was graduated from Harvard in 1894, and studied in Germany and France. Colgate University conferred on him the honorary degree of D. Sc., and he was awarded gold medals by the Geographical Society of France and the American Geographical Society. Among the learned and scientific societies of which he was a member are the American Association for the Advancement of Science; Geological Society of America; Mining and Metallurgical Society; The American Mining Congress; American Institute of Mining Engineers; Association of American Geographers; American Geographical Society; Explorers' Club; Washington Academy of Sciences; Societe Belge de Geologie and the Geological Society of Washington.

Dr. Bruno V. Nordberg, founder of the Nordberg Manufacturing Company, died at his home in Milwaukee, October 30, 1924. Dr. Nordberg organized the Nordberg Manufacturing Company in 1886 and has for more than 40 years been closely associated with engineering progress and the development in power and mining machinery. Among his most prominent achievements was the design of large hoists and compressors for metal mine service. In 1897 he designed the famous hoist for the Tamarack Mining Company, which had a drum 25 feet in diameter and for many years held the record for size. Another unusual design for which he is responsible was that of the compound condensing reel hoist, built for the Homestake Mining Company of Lead, South Dakota. What was considered his greatest achievement in this direction was the building of the mammoth hoist for the Quincy Mining Company at Hancock, Michigan.

He was a member of a large number of engineering and scientific societies. Dr. Nordberg's death is a distinct loss to engineering and mining.

## MISLEADING COST INFORMATION

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a positive loss, because loss of efficiency rapidly runs into, not cents, but quarters and half dollars per ton.

Of even greater importance is the fact that all producers are not equal in reliability, or in character. I have heard that that same thing is true in all business. I know of my own knowledge that it is true of coal men.

Also, there is an old saying to the effect that "like begets like." This being interpreted means that if the buyer shops around looking for bargains, he will attract to himself those producers and merchants who are always looking around for the best price or the best margin of profit that they can get. The man who shops for a saving today may, tomorrow, attract to himself only those who are asking the highest possible price in a tight market. It is true in coal that those who took the highest prices in 1920 and 1922 are the very persons who, today, are taking the lowest prices. I believe it is also true that those who attracted to themselves the highest priced sellers two and four years ago are now attracting to themselves those who are selling at the lowest prices. This also, being interpreted, means that those who made the big profits two and four years ago are today rapidly eating them up in large losses. And those who are paying the low prices today are but recovering part of the excess price they paid two and four years ago. Over a spread of five years, therefore, the thing irons itself out to a fair average price where a man pays for what he gets and gets what he deserves. Of course, it is true that neither buyer nor seller make anything in the long run by those violent extremes of prices. That brings us back to the fundamental proposition, viz, that since the price has to be paid in the long run, the most satisfactory relationships are those which result in a buyer of character dealing with a producer or merchant of character.

When you get upon that basis, it certainly is not true and cannot be true that the whole number of coal producers and merchants can live up to the high standard of character implied or demanded. If, thus, persons of character are relatively few in number, the consumer's buying radius is still further limited. The consumer not only has relatively few mines which he can patronize at a profit to himself, but, out of the number of mines available, he has only a relatively few operators whom he can patronize with comfort to himself. This is so because only a relatively few have the conscience or the moral stamina which will abide by commitments when made and, on the basis of quid pro quo, will deliver coal in tight times out of con-

sideration for the fact that the consumer has given them his business in periods of poor demand.

The essence of it all, of course, is that dealings in coal, as in any other commodity, are, if satisfactory and dependable, matters of personal relationships. As I have said, the use of coal is local. The source of supply is local. Certainly matters of character are personal. If into that delicate situation there is introduced any figures of the industry—whether they be of mere numbers of mines or average prices—the result is likely to be a misleading impression and away from, rather than toward, sane merchandising. This very information may have been valuable in improving the public relationships of the coal industry. It may, even, have been valuable in limiting productive capacity or investment. It may have added, therefore, a few cents per ton to good will. It may have saved a few cents per ton in investment. But the strong probabilities are that these savings have more than been dissipated by the loss per ton caused by the unnecessary complication of the merchandising problem.

## NEW INCOME TAX REGULATIONS

(Continued from page 535)

payer's depletion rate is arbitrarily reduced. The Smoot Amendment to the discovery clause would have corrected this injustice.

### LIMITATION ON DEPLETION

The 1924 act limits the depletion allowance based on discovery value to 50

percent of the net income, computed without depletion, from the property on which the discovery was made. The regulations merely repeat the wording of the law. (See Article 1602.) Many grave injustices will be suffered by oil companies by reason of this limitation. Whether or not it will operate unjustly in the majority of cases cannot be ascertained until it has been thoroughly tested. Unquestionably, it will increase the administrative difficulties without producing compensatory advantages to the government. This limitation is one of several ill-advised and unjust provisions of the 1924 act that tend to discourage industrial development.

### DEPLETION DISTRIBUTIONS

It is necessary that every mining corporation be thoroughly informed as to distributions from depletion and depreciation reserves. Such a distribution not only will be applied against and thus reduce the cost or other basis of the stock upon which declared for the purpose of determining gain or loss from the subsequent sale of the stock, but the amount by which the aggregate of such distributions exceeds the basis of the stock constitutes taxable income. (See Articles 1543-1546, inclusive.)

A distribution made from a depletion reserve based on discovery value of a mine will be treated in the same manner as one from a depletion reserve based upon cost or March 1, 1913, value. This places taxpayers who have or may discover a mine since March 1, 1913, on a substantial equality with taxpayers whose mines were discovered prior to that date, and in a measure removes the discrimination between individuals who make discoveries and those who have a beneficial interest in discoveries made by corporations in which they are stockholders.

### EVASION OF SURTAXES

An attempt has been made to put teeth into the language of Articles 351 and 352, which deal with evasion of surtaxes under Section 220 of the law. Statutory presumptions are established. The penalty provision is particularly drastic, the penalty being a tax of 50 percent upon the net income of the offending taxpayer, in addition to the normal tax.

Here again the administration of the law is made onerous and expensive to taxpayers and difficult for the department, if a serious effort is made to enforce this section of the statute. Opportunity is given to harass taxpayers who may, for some legitimate and sound business reason, wish to accumulate and retain a large surplus. But the department has exercised common sense in the past in administering this section, and may be expected for the next few years to continue under a common-sense policy.



## ELIMINATION OF WASTE

(Continued from page 553)

Much progress has already been made in consolidation of and interchange of service of public utilities. The railroads are today working actively toward that end through consent of the Interstate Commerce Commission. Meanwhile in America's large manufacturing industries the old principle of "crush them rather than control them" still applies, which means that the ultimate consumer pays the price of our stupidity.

We all know that the World War was a cause of the present political, economic and social unrest in this country and in Europe. We know also that political problems are more easily and quickly adjusted than the economic because the economic problems strike deeply into the standard of living of the masses. Broadly speaking, human selfishness has always been and still is the directing influence in all that we do. No American family will consent to reduce standards of living without open resentment. Every American family will gladly welcome and give full support to any means that will give work with less effort, thus making the journey through life a happier one. They will justly ask how this can be accomplished, but their consent to it will be unanimous. As the problem is an economic one it must be based primarily on lower costs. These may, in part, be divided as follows:

1. Elimination of waste.
2. Standardization of equipment.
3. Quantity production.
4. Higher labor efficiency.
5. Reduced wage.

Of these five cost elements, No. 5, or "reduced wage," we will leave to the court of last resort, viz, grueling competition with others of lower standard of living. Only through necessity, and after all other means have failed, must we accept a lower standard of living, which reduced wage will force upon us.

Happily, there appears to be a way out through elimination of waste through standardization, through quantity production, and through higher labor efficiency. We must lack vision if we do not move fast for the solution through these four avenues. Only large industries with highly organized technical staffs have as yet made much headway at cost reductions. If accomplishment can be attained by a modification of the old restraint of trade statutes to fit the present and oftentimes useless competition at home, and to meet the imminent drive which American labor is facing when Europe returns to normal production, then we should move to that end. By amending present laws so as to allow more freedom in the merging of similar industries—yet with full protection to the ultimate consumer—I firmly believe

that economies sought for through standardization may be realized.

Now, it may appear that too much criticism has been directed against the manufacturers, and some difference of opinion may come from these remarks. As a firm supporter of standardization, I rather hope it will, for we may then develop by frank discussion just how, and how soon, the serious problem of elimination of waste will be fully met.

## SILVER PRODUCERS

(Continued from page 537)

in the preliminary stages of this movement.

We do feel, however, that the American Mining Congress, great as it is, and potent as its influence has been, cannot and should not give to this question the intensive study that it requires. Nor should it be asked to furnish the large funds necessary to properly carry out the aims and purposes of the movement. A separate organization, officered, financed and otherwise equipped for the special purposes indicated seems clearly to be the best way to approach this world-wide problem and to accomplish a reasonable solution.

## ABRASIVE MATERIALS IN 1923

THE production of natural abrasive materials in 1923 was much larger than in 1922, according to the Geological Survey. The total quantity produced was about 250,000 tons, valued at more than \$4,000,000. In addition there was produced in 1923 more than 80,000 tons of artificial abrasives, valued at \$8,778,000.

The Interior Department will spend \$38,425,336 less during the fiscal year ending June 30, 1925, than it did during the fiscal year ending June 30, 1924, according to a tabulation of appropriations just completed at the Interior Department.

## WEST VIRGINIA-KENTUCKY MEETING

The Fourth Annual Convention of West Virginia-Kentucky Association of Mine, Mechanical and Electrical Engineers will be held on December 12th and 13th at the Frederick Hotel, Huntington, W. Va. Among the papers to be presented are—"Rotary Converters as Compared with Motor Generators"—F. M. Reigher. "Anti-Friction Bearing as Compared with Plain Type Sleeve Bearing for Mining Machinery"—N. A. Johnson. "Voltage Control in Mines by Use of Storage Batteries"—Byron B. Minium. "Electrical Department Methods of the Southern Mining Company"—F. A. Signer. "Reducing Cost by Proper Supervision of Mechanical and Electrical Equipment"—J. H. Edwards.

## NEW EQUIPMENT CATALOGS.

Stephens - Adamson Manufacturing Company at Aurora, Illinois, has just issued a new booklet on "S-A" Chains and Gears. The book is beautifully bound and profusely illustrated, and gives complete information on the equipment produced by this company, being the most complete and beautiful catalog yet issued by them. Copies are available upon request.

Ludlow-Saylor Wire Company, St. Louis, Missouri, has just issued a new catalog on the "Perfect" double crimped wire cloth and Rec-Tang screens—their products. This catalog represents a great advance from the standards set by their former text books, offering the choice of hundreds of screens not heretofore listed by any manufacturer. Complete information is given on every grade, including weight, comparative lists of different metals, decimal and metric equivalents of standard designations, and the book is most profusely illustrated. The new screen section in this beautiful catalog is of special service to the screen user as it emphasizes the wide range of choice available for screens for any purpose. Copies of the book gladly sent upon request.

The Jeffrey Manufacturing Company, Columbus, Ohio, has just issued a new bulletin No. 408 on "Mine Fans and Mine Ventilation." This bulletin is written by W. J. Montgomery, Mine Ventilation Engineer, and gives a comprehensive idea of some of the fundamental principles of mine ventilation. Bulletin No. 408 is also a bulletin on "Jeffrey Universal Blowers for Coal and Metal Mines," which illustrates and describes the recent changes in design of Jeffrey small blowers for secondary mine ventilation. Both of these bulletins are now available to the mining fraternity.

A new roller shaft bearing—the Allis-Chalmers Timken—is described in bulletin 4048 of the Allis-Chalmers Mfg. Co., Milwaukee, Wis.

## PEAT PRODUCED IN 1923

THE peat produced in the United States in 1923 amounted to 61,355 short tons, valued at \$376,834, based on figures compiled in the Geological Survey by K. W. Cottrell. The quantity was greater by 675 tons, or less than 1 percent, than the output in 1922, but the value was \$20,895, or 5 percent, less than the value of the output in 1922.

Dings Magnetic Separator Company of Milwaukee, Wis., announces the opening of an office at 229 Lovering Avenue, Buffalo, N. Y., to handle sales in that territory. It is also announced that the Dings office at Birmingham, Ala., has been moved from Brown Marx Building to 513 North Twenty-first Street, Birmingham, Ala.



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THE water supply system for Greater New York was designed with the thoughts of reserve supply and safety foremost. Up in the Catskills, near the source of this water supply, is the Ashokan reservoir. This is ample for New York in the far distant future. A few miles away is the Kensico reservoir, built for safety. On the outskirts of the city there is a third reservoir, and on Staten Island a fourth.

Linde's national system of 115 plants and warehouses is like the New York water system. The reserve facilities of any or all of these plants and warehouses can be directed toward the single plant or warehouse that is your source for oxygen.

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38 PLANTS—77 WAREHOUSES

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One welder says that these books will enable him "to perform welding operations he was previously refusing." Another says they contain "information of high value," and a third adds, "... something I have been looking for."



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Allentown, Pa.

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Ohio.

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## AUTOMATIC CAGE STOPS

Mining Safety Device Co.,  
Bowerston, Ohio.

## AUTOMATIC CAR CAGES

Connellsville Mfg. & Mine Supply  
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## AUTOMATIC FEEDERS, GRAVITY

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Pa.

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son, N. J.

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## BELTING, SILENT CHAIN

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## BINS (Coke and Coal)

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## BIT SHARPENERS

Ingersoll Rand Co., 11 Broadway,  
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## BLASTING POWDER

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Wilmington, Del.

## BLASTING SUPPLIES

du Pont Powder Co., The E. I.,  
Wilmington, Del.

Hercules Powder Co., 934 King St.,  
Wilmington, Del.

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Lidgerwood Mfg. Co., 96 Liberty  
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Mining Safety Device Co., Bowers-  
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Pa.

Mining Safety Device Co., Bowers-  
ton, Ohio.

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kee, Wis.

Connellsville Mfg. & Mine Supply  
Co., Connellsville, Pa.

G. M. Johnson Mfg. Co., Jeannette,  
Pa.

Lidgerwood Mfg. Co., 96 Liberty  
St., New York City.

Traylor Engineering & Mfg. Co.,  
Allentown, Pa.

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Morse Chain Co., Ithaca, N. Y.

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## CHAINS, COAL CUTTING

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## CHAINS, FRONT END

Morse Chain Co., Ithaca, N. Y.

## CHAINS, OILING

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## CHAINS, SLING

Morse Chain Co., Ithaca, N. Y.

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Bldg., Philadelphia, Pa.

Lehigh Coal & Navigation Co.,  
Philadelphia, Pa.

Thorne, Neale & Co., Philadelphia,  
Pa.

Bertha-Consumers Company, Cham-  
ber of Commerce Bldg., Pitts-  
burgh, Pa.

## COAL CRUSHERS

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Co., Connellsville, Pa.

Jeffrey Mfg. Co., 958 N. Fourth St.,  
Columbus, Ohio.

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Ingersoll-Rand Co., 11 Broadway,  
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Jeffrey Mfg. Co., 958 N. Fourth St.,  
Columbus, Ohio.

## COAL HANDLING MA- CHINERY

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Lidgerwood Mfg. Co., 96 Liberty  
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Bldg., Pittsburgh, Pa.

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Ingersoll-Rand Co., 11 Broadway,  
New York City.

Jeffrey Mfg. Co., 958 N. Fourth St.,  
Columbus, Ohio.

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Jeffrey Mfg. Co., 958 N. 4th St.,  
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kee, Wis.

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New York City.

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Allentown, Pa.

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kee, Wis.

## CONCRETE REINFORCE- MENT

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cago and New York

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verizer Co., 942 North 1st St.,  
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Lidgerwood Mfg. Co., 96 Liberty  
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kee, Wis.

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## CRUSHERS

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Gruendler Patent Crusher and Pul-  
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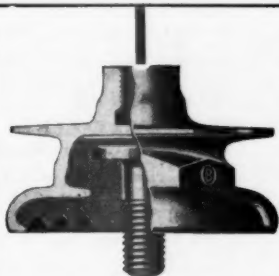
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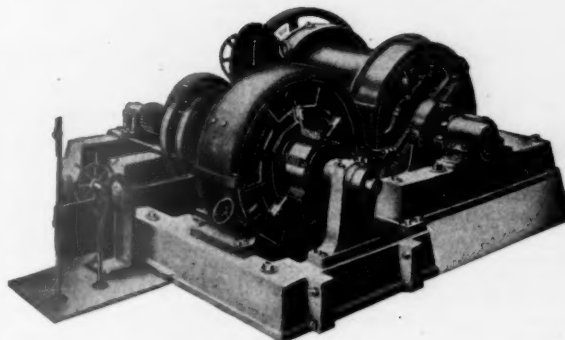
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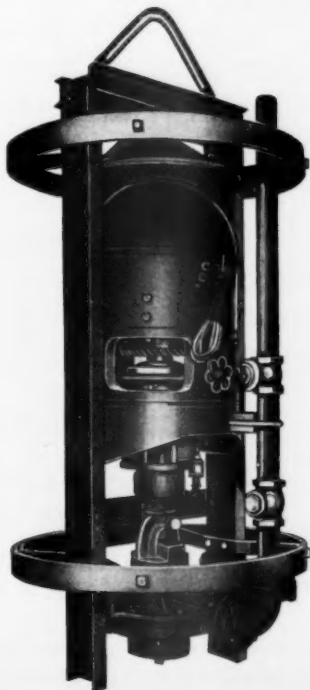
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 Ingersoll-Rand Co., 11 Broadway, New York City.  
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**DRUMS (Hoisting, Haulage)**

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 General Electric Co., Schenectady, N. Y.

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 Goodman Mfg. Co., Forty-eighth Place and Halsted St., Chicago, Ill.  
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 Ohio Brass Co., Mansfield, Ohio.

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**ELECTRICAL SUPPLIES**

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 Traylor Engineering & Mfg. Co., Allentown, Pa.

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**ELEVATOR MACHINERY**

Jeffrey Mfg. Co., 958 N. Fourth St., Columbus, Ohio.

**ENGINE TRIMMINGS**

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**ENGINEERING APPLIANCES**

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 Ingersoll-Rand Co., 11 Broadway, New York City.

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 Ingersoll-Rand Co., 11 Broadway, New York City.

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Allis-Chalmers Mfg. Co., Milwaukee, Wis.  
 Ingersoll-Rand Co., 11 Broadway, New York City.

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 Hunt, Robert Company, Insurance Exchange, Chicago, Ill.  
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**GEARS, SILENT CHAIN**

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 Goodman Mfg. Co., Halsted St. and 48th Pl., Chicago, Ill.

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 Connellsville Mfg. & Mine Supply Co., Connellsville, Pa.  
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 Jeffrey Mfg. Co., 938 N. 4th St., Columbus, O.

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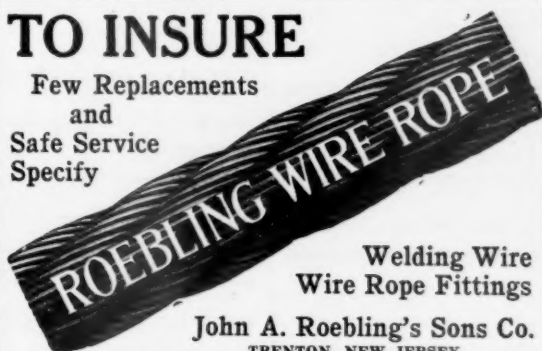
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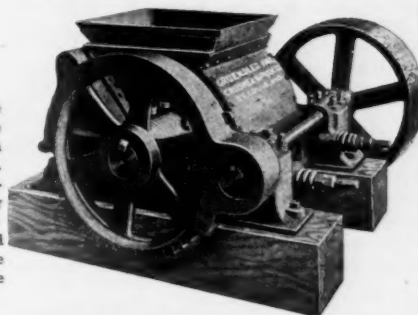


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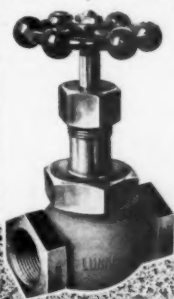
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 George Watkin Evans, Consulting Coal Mining Engineer, L. C. Smith Bldg., Seattle, Wash.

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 C. L. Harrod, Electrical Engineer, Indiana Coal Operators' Power Association, Indianapolis, Ind.  
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